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CURRENT EXPERIMENTS IN PARTICLE PHYSICS

Particle Data Group

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Abstract – This report contains summaries of current and recent experiments in Particle Physics. Included are experiments at BEPC (Beijing), BNL, CEBAF, CERN, CESR, DESY, FNAL, Frascati, ITEP (Moscow), JINR (Dubna), KEK, LAMPF, Novosibirsk, PNPI (St. Petersburg), PSI, Saclay, Serpukhov, SLAC, and TRIUMF, and also several proton decay and solar neutrino experiments. Excluded are experiments that finished taking data before 1991. Instructions are given for the World Wide Web (WWW) searching of the computer database (maintained under the SLAC–SPIRES system) that contains the summaries.

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INTRODUCTION

This report contains full summaries of 180 approved current and recent experiments in elementary particle physics. The focus of the report is on selected experiments which directly contribute to our better understanding of elementary particles and their properties such as masses, widths or lifetimes, and branching fractions. This year's report is, in a way, a companion volume to the main Particle Data Group publication, *Review of Particle Physics.* Experiments at the following laboratories are included:

BEPC (Beijing) *
BNL (Brookhaven) *
CEBAF (now Jefferson Lab)
CERN (Geneva) *
CESR (Cornell U.) *
DESY (Hamburg) *
FNAL (Batavia) *
Frascati (Lab. Nazionali)
ITEP (Moscow) *
JINR (Dubna) *
KEK (Tsukuba) *
LAMPF (Los Alamos) *
Novosibirsk (Inst. Nucl. Phys.)
PNPI (St. Petersburg)
PSI (Villigen) *
SATURNE (Saclay) *
Serpukhov (Inst. High Energy Phys.)
SLAC (Stanford U.) *
TRIUMF (Vancouver)
Underground experiments
Underice experiments
Underwater experiments

For the institutions marked with an asterisk, the corresponding summaries section also contains a brief description of the particle physics plans at the laboratory till the end of the century.

We also list 263 other experiments at the above laboratories. Although, to the best of our knowledge, these experiments do not measure directly the properties of particles listed in the *Review of Particle Physics*, they still may be of considerable interest to the particle physics community. These additional experiments only have brief entries in the printed version of the report, but often have a full description in an online-accessible database from which the report is produced. The readers are encouraged to find more information about those experiments in the database (see below).

We exclude from this year's report the experiments for which the data collection was completed before 1991. We generally do not cover the experiments dealing primarily with nuclear levels or other nuclear-structure properties. As to the choice of institutions, we try to include those in which particle physics experiments top the list of priorities at the laboratory.

Sources of information — Our first information about an experiment usually comes from the proposal for the experiment. Subsequently, we follow the progress of the experiment as best we can in laboratory reports such as *Experiments at CERN.* Finally, a few months before an edition of this report is to appear, we send copies of the summaries of the experiments to the spokespersons for checking and updating. If a reply is received — as was the case for 90% of the experiments — there is a "✓" next to the spokesperson's name. Since current experiments are often in flux, we rely heavily on these replies to be up to date: no ✓ by the spokesperson means the summary may be inaccurate or incomplete. (For a handful of experiments, we verified our information with a senior member of the experiment, not the spokesperson, but for simplicity put a ✓ by the spokesperson. For experiments with more than one spokesperson, all the spokespersons are checked even if only one of them replied.)

Computer database — This report is produced from a computer database maintained at SLAC under the SPIRES database management system. The database, named EXPERIMENTS, also contains information from earlier editions of this report, going back to about 1975, and including older experiments at Argonne, INS, IUCF, and Rutherford. See page 3 for a guide to using the EXPERIMENTS database via the World Wide Web (WWW).

Summaries — Each summary lists several dates related to the experiment: the date of the proposal, the approval date, and when the data-taking began and was completed. The title of the proposal and the most recent list of participants are given. The detector used in the experiment is identified either by a generic name (e.g., counter) or by a widely known acronym (e.g., SLD). The most important reactions and particles studied and the beam energy or momentum are listed where known. A brief comment describing the apparatus and the main goals of the experiment may follow. A summary ends with a list of any journal articles on results or instrumentation of the experiment. Related experiments, similar either in methods used or in subject of study, are also listed. Where known, an e-mail contact address and the WWW uniform resource locator (URL) are given.

Abbreviations — To keep the summaries brief, abbreviations are used to indicate journals, kinematic variables, accelerators, and detectors. The abbreviations are usually obvious but are also defined near the beginning of the report. The abbreviated forms are needed for searching the EXPERIMENTS database online.

Acknowledgments — P. Yamin (BNL), D. Buckle (CEBAF), M. Draper and B. Powell (CERN), and J. Parker (FNAL) kindly provided computer files with data on experiments from their respective institutions. Valuable additional information was obtained from P. Yamin (BNL), G. Fraser (CERN), P. Drell (CESR), P. Folkerts (DESY), R. Rubinstein (FNAL), M.V. Danilov (ITEP), H.K. Walter (PSI), and D.W. Leith (SLAC). We thank F.E. Armstrong (LBL) for her help with the final processing of the manuscript. We particularly thank the hundreds of spokespersons who took the time to reply to our inquiries.

Comments and requests — We invite comments pointing out omissions, obscurities, out-of-date information, and errors. We also encourage spokespersons to send us proposals and letters of intent for their future experiments. Comments and other material should be sent to:

EXPERIMENTS (c/o H. Galić)
SLAC Library, MS 82
P.O. Box 4349
Stanford, CA 94309, USA

e-mail: `expbase@slac.stanford.edu`

To order additional copies of the *Current Experiments* from North and South America, Australia, and the Far East write to:

CURRENT EXPERIMENTS
Particle Data Group, MS 50-308
Lawrence Berkeley National Laboratory
Berkeley, CA 94720, USA

e-mail: `pdg@lbl.gov`

Requests from all other areas should go to:

CERN Scientific Information Service
CH-1211 Geneva 23
Switzerland

`http://wwwas.cern.ch/library/`
(select – Ordering CERN Publications)

SEARCHING THE 'EXPERIMENTS' DATABASE VIA WORLD WIDE WEB

The summaries of current and many earlier experiments related to particle physics are contained in a computer database called EXPERIMENTS, maintained at SLAC under the SPIRES database management system. Note that even the experiments which only have a brief description in this report may still have a full description in the database. You can access the EXPERIMENTS database most easily via the World Wide Web (WWW). The first part of this section describes a simple database search based on the Web forms. This is followed by a few examples of a more advanced search technique. The concluding part lists some other computer-reachable sources of interest to experimental particle physicists.

General information — If your computer is linked to the Internet, you should be able to access the World Wide Web. The Web was brought to life in the early nineties by Timothy Berners-Lee and collaborators at CERN. Free WWW software is available for various platforms and various needs, from PC's to large computer systems, from simple line-mode browsers to sophisticated full-screen navigators. Names of some of the popular software packages that enable the Web access are Lynx, Netscape, and Mosaic, but the selection is by no means restricted to those three. Learn from your local computing center where and how to obtain the Web software most appropriate for your computer.

EXPERIMENTS home page — The EXPERIMENTS database and many other SPIRES-based SLAC Library databases are searchable via WWW. Find the home page for the EXPERIMENTS database at:

`http://www-spires.slac.stanford.edu/find/experiments`

When you open this document, you find a simple form which allows you to fill in one or several elements which best describe your search criteria. In the old days, when the database was only accessible through e-mail, you had to send a request written in the SPIRES search language to the SPIRES e-mail server. The Web form eliminates this step, and even a novice can immediately begin a searching session. Furthermore, a Web search presents much more than the old e-mail search method. The e-mail result was a text, while the WWW result is a hypertext. The marked hypertext leads to related links, and you can, for example, find a more thorough bibliographic description of journal articles corresponding to a given experiment (from the HEP database), and often read or print a postscript version of such articles. Similarly, if an experiment has a Web home page, you will be able to get there easily, and you may also find a direct link to the database entries of the experiments related to the selected one.

Simple form searching — Forms, in general, are simple to use and don't require much explanation. Explore them on your own, or use the following hints to get to the expected result even sooner. The EXPERIMENTS form allows you to find a result by a title-word search, by a search for a participant in an experiment, or by the experiment's official code number. You can also find all the experiments in which a certain institution is involved, or your search could be based on, for example, the particles studied in an experiment. You fill in the entries you know, leaving the others blank. The 'result' of a search is a database entry which fully describes an experiment, including the complete list of authors, a title, a description of the experiment's goals and methods, a list of resulting journal articles, etc.

To find all the experiments in which the author Johnson has participated, type the author's last name (surname) into the appropriate box. If an initial is added, separate it by a comma, e.g., `johnson, g`. Keep in mind that somebody you may know as Betty could officially be Elizabeth, Bob may be signing his papers as Robert, etc. If you are not sure what the right first name is, just do not use the initial. The last name can be truncated, e.g., `leder#` for Lederman. To deal with a combination of several authors, use the words **and**, **or**, and **and not**, e.g., `johnson or smith` will yield experiments by either physicist, `johnson and smith` will find experiments in which both have participated, whereas `johnson and not smith` will yield experiments by Johnson so long as Smith is not involved. If a special character appears in a name, such as the ü in the German spelling of Müller, try alternate spellings, such as `muller or mueller` . If you happen to know that author Johnson is from SLAC, for example, use both the participant and the affiliation boxes. If you are only interested in experiments which author Johnson did at Fermilab, type in the name (`johnson`), and also select Fermilab in the list of accelerators. To initiate a search, press the Perform Search button. Do not forget to use the Clear All Fields button between two searches.

If you are interested in the experiments that study the CP violation, for example, try the title-word search. Enter any or all expected words from the title in any order. A truncated search may be used, e.g., `cp#` in the title-word box yields titles containing the word CP standing free (as in CP violation), and also all the titles in which CP is hyphenated (as in CP-violating). If you type `solar neutrino` into the title-word box, you will find all the experiments with these two words (any order) in the titles. You can combine any number of other elements with your title-word search. For example, to find some of the recently approved CP violation experiments, type `cp#` in the title-word box, and select 'After' and '1990' in the two pull-down menus for the date-approved search element.

To find all the experiments in which people from a given institution participated, type the institution's name (exactly as it appears in this report's summaries) into the affiliation box. Similarly, type the experiments' official code number, as it appears in this report, into the exp-number box (e.g., type `cern-na-048` to find more about the NA48 experiment at CERN). For many experiments you can also use a nickname instead of the complete code number. For example, if you type `opal` in the exp-number box, you will find the CERN-LEP-OPAL entry, while `d0` or `dzero` yields the FNAL-740 description. (You can also find the OPAL and D0 entries by selecting the corresponding detectors in the list of detectors). To find both D0 and CDF entries, use `dzero or cdf`, and to find all four LEP experiments, type `cern-lep-#` into the exp-number box.

To use the studied-particle box, you must know the database-adopted spelling of various particles. We use `k+`, for example, and not `kplus` for K^+, and `pi0`, not `pizero` for π^0. An antiparticle name in the database is usually formed by adding the suffix **bar** to the corresponding particle name. Thus the antiproton in the studied-particle box should be written as `pbar`. An extensive list of the 'correct' particle names can be found on the EXPERIMENTS help page. (Note that the particle names in the studied-particle search are strictly standardized. In a title search, to the contrary, particle names are somewhat variable in their spelling and several forms should be tried).

If you are interested in finding all the experiments at a given accelerator, select the appropriate laboratory in the list of accelerators. Similarly, if you know a detector's name, try the list of detectors. The defaults are 'Any Accelerator' and 'Any Detector'. The date-approved search is useful if you know the approval year. You can also eliminate older experiments from your search result if you select the date-approved carefully. The default for the date-approved is 'Don't Know'.

Advanced searching — For the old hands and for those who want to have better control over searching, the form has a separate part named 'Make your own search'. This part only has one search window into which you type a complete SPIRES search command. To learn more about the SPIRES search language, check the 1994 and earlier editions of *Current Experiments*. Here we give a few examples of what could be typed into the SPIRES search window. We use lower case, but a search is case insensitive, and in an actual search you may use both lower and upper case characters.

> Important note: whenever a term you wish to find contains characters, ')' , '>' , '<' , or '(' , the entire search value must be enclosed in double quotes (**see examples below**)

FIND, SHOW and BROWSE are some of the command verbs you can use in SPIRES searching. You can formulate a variety of search commands by using these three verbs. For example,

`show indexes`

(Shows the available search terms, e.g., AUTHOR, PAPER, EXP, etc. Use these terms in your search request to BROWSE and FIND, e.g., BROWSE AUTHOR ... , or FIND PAPER ... , FIND EXP ... , etc.)

`browse author trilling`

(Displays values in the author-name index surrounding the stated value.)

`browse exp`

(No search value for EXP is given. SPIRES returns several random values of experiment code-numbers.)

`browse exp desy`

(Displays values in the code-number index alphabetically surrounding the specified value. Useful if you do not know the exact form or spelling of a search value.)

`find author rubbia, c` or

`find author c rubbia`

(Finds experiments in which the stated author has participated. The first-name initial is optional: `find author rubbia` will also work fine.)

`find exp saturne-258`

(Finds the record corresponding to the specified value.)

`find paper "PR D37 (1988) 1131"`

(Finds the experiment reported in the stated reference. Note that the reference has spaces but no commas between the elements. Double quotes are obligatory, see the box above.)

`find reaction "e+ e- --> mu+ mu- x"`

(The 'arrow' is composed of two minus signs and a 'greater-than' sign. Note the obligatory quotes.)

`find ac kek-tristan`

(Finds experiments using the stated accelerator.)

`find de crystal-ball`

(Finds experiments using the stated detector.)

`find title cp phase difference`

(Finds experiments with the words CP, PHASE, and DIFFERENCE in the title. The order of title words in a search command is unimportant.)

`find af rutgers u`

(Finds experiments in which people from the stated institution participated.)

`find af rutger#`

(Finds experiments with the stated affiliation. '#' represents any remaining characters.)

`find particle d+`

(Finds experiments studying the specified particle.)

The following search commands are also allowed:

`find author prefix patters`

(Finds authors whose last names begin with the string PATTERS, e.g., Patterson)

`find af prefix northwest`

`find reaction prefix pi+ n`

`find exp sld`

(For most of the large experimental collaborations you may type just the collaboration name instead of the full experimental number)

Compound searching is not only possible, but also desirable, because it keeps search results smaller:

`find author prokoshkin and exp prefix cern`

`find af moscow, itep and not date before 1992`

`find particle j/psi or "psi(2s)"`

Occasionally a search may fail. With some care you can reduce unsuccessful searching to a minimum: (i) Remember that any search value containing any of the special characters) , > , < , (, **must** be enclosed in double quotes. See the examples above for the PAPER, REACTION, and PARTICLE searches; (ii) Use the 'correct' form of a search value: a database-adopted particle name (e.g., K+, not Kplus), proper experiment code-name (e.g., FNAL-761, not FNAL-E761), etc. To find the correct forms, use the BROWSE command for the index you are searching.

Other SLAC-SPIRES databases — Several other SLAC Library databases of interest to experimental physicists are available via WWW. They are all listed on the SPIRES home page:

`http://www-spires.slac.stanford.edu/find/spires.html`

(1) HEP-PREPRINTS database is a joint project of SLAC and DESY libraries, and contains more than 320,000 bibliographic entries on particle physics papers (preprints, journal articles, reports, theses, conference papers, etc.); (2) BOOKS contains bibliographic summaries of more than 20,000 textbooks, conference proceedings, monographs, etc., covering high-energy physics and related topics; (3) CONFERENCES database lists past and future conferences, schools, and meetings of interest to the particle-physics community; (4) HEPNAMES contains more than 30,000 e-mail addresses of people working in high-energy and medium-energy physics. (By the way, you can retrieve the HEPNAMES data without leaving the EXPERIMENTS search form: to get the author Johnson's e-mail address, for example, just type the command `query johnson` into the 'Make your own search' window); (5) Database INSTITUTIONS lists about 5,000 addresses (and, often, phone and fax numbers) of institutions related to high-energy physics.

Other computer accessible sources — Clones of the EXPERIMENTS database are maintained for local users at the Yukawa Institute (Kyoto-SPIRES), Durham University (Durham–RAL BDMS), and IHEP (Protvino BDMS). The Durham version can also be found at `http://cpt1.dur.ac.uk/HEPDATA/EXP`

A Web document called Experiments Online is a guide to home pages of various high-energy physics collaborations. It is updated weekly. To add your experiment's home page to the document, write to `expbase@slac.stanford.edu` . Find Experiments Online at:

`http://www-spires.slac.stanford.edu/find/explist.html`

We urge all active experimental collaborations to establish their home pages on the Web. Such pages keep the collaboration members better informed, and should also serve to represent the group to the world. At the very minimum, each home page should list the current members of the collaboration and identify the spokesperson, give the objectives of the experiment and describe the experimental apparatus, and list the journal articles, conference papers and preprints which have resulted from the collaboration's work.

Experimental physicists are invited to post their papers to the `hep-ex` e-print archive. To receive detailed instructions on submitting and retrieving papers, send a blank e-mail message with the subject **help** to: `hep-ex@xxx.lanl.gov` . E-mail listings of the experimental physics titles and abstracts submitted to the archive can be received daily by sending a blank e-mail with the subject **subscribe** <your–name> to `hep-ex` . The listings and papers can also be accessed through the Web link `http://xxx.lanl.gov/`

You will find a well-documented list of other computer accessible sources of interest to particle physicists in the latest edition of the *Review of Particle Physics*, Physical Review D54 (1996) 1–720. The list is also posted at:

`http://www.slac.stanford.edu/library/pdg/hepinfo.html`

The *Review* itself is available over the Web. Check the Berkeley Particle Data Group WWW server at `http://pdg.lbl.gov/`

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PERDRISAT, C.F. (William & Mary Coll.) CEBAF-93-027
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PERROT, F. (Saclay) SATURNE-144
PETERSON, R.J. (Colorado U.) BNL-874
PETERSON, R.J. (Colorado U.) KEK-352
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PETRATOS, G.M.G. (Kent State U.) CEBAF-93-024
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PLATNER, E.D. (Brookhaven) BNL-810
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POLING, R.A. (Minnesota U.) CESR-CLEO
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QUERCIGH, E. (CERN) CERN-WA-097
RAGAZZI, S. (Milan U. and INFN, Milan) CERN-NA-056
RAI, G. (LBL, Berkeley) BNL-895
RAMEIKA, R.A. (Fermilab) FNAL-800
RAPIN, D. (Geneva U.) SATURNE-225
REAY, N.W. (Kansas State U.) FNAL-803
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REKALO, M.P. (Kharkov, FTI) JINR-LHE-0941-3
REMSBERG, L.P. (Brookhaven) BNL-859
RIPANI, M. (INFN, Genoa) CEBAF-93-006
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RITCHIE, B.G. (Arizona State U.) CEBAF-94-008
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ROBERTS, D.A. (Michigan U.) LAMPF-1310
ROBERTS, J.B. (Rice U.) BNL-817
ROCK, S.E. (American U.) SLAC-E-140X
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ROEHRICH, K. (Julich, Forschungszentrum) CERN-PS-185-3
ROLANDI, L. (CERN) CERN-LEP-ALEPH
RONDON, O.A. (Virginia U.) SLAC-E-143
ROSSI, L. (Genoa U. and INFN, Genoa) CERN-WA-092
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SHINOHARA, A. (Nagoya U.) KEK-262
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SITNIK, I.M. (Dubna, JINR) JINR-LHE-0941-3
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SLATTERY, P.F. (Rochester U.) FNAL-706
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SMITH, E. (CEBAF) CEBAF-93-022

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SOKOLOVSKY, V.V. (Moscow, ITEP) SERPUKHOV-147
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ABBREVIATIONS USED IN THE SUMMARIES

JOURNALS

Following are abbreviations for journals listed in the summaries:

APL	Applied Physics Letters
APP	Acta Physica Polonica
AOPT	Applied Optics
ASPP	Astroparticle Physics
ASTJ	Astrophysical Journal
CPC	Computer Physics Communications
DANS	Doklady Akademii Nauk SSSR (in Russian)
ECHAYA	Fizika Elementarnykh Chastits i Atomnogo Yadra (translated as PPN)
EPL	Europhysics Letters
FBS	Few Body Systems
HEPNP	High Energy Physics and Nuclear Physics (in Chinese)
HFI	Hyperfine Interactions
IEEE TNS	Institute of Electrical and Electronics Engineers, Transactions on Nuclear Science
IJMP	International Journal of Modern Physics
JDEP	Journale de Physique
JETPL	Journal of Experimental and Theoretical Physics Letters (English translation of ZETFP)
JOSA	Journal of the Optical Society of America
JPHY	Journal of Physics
JPSJ	Journal of the Physical Society of Japan
LNC	Lettere al Nuovo Cimento
MPL	Modern Physics Letters
NATU	Nature
NC	Nuovo Cimento
NIM	Nuclear Instruments and Methods
NP	Nuclear Physics
PAN	Physics of Atomic Nuclei (English translation of YF)
PHYU	Physics - Uspekhi (English translation of USP)
PL	Physics Letters
PPN	Physics of Particles and Nuclei (English translation of ECHAYA)
PR	Physical Review
PRL	Physical Review Letters
PRPL	Physics Reports
PS	Physica Scripta
PTE	Pribory i Tekhnika Eksperimenta (in Russian)
PTP	Progress of Theoretical Physics
PW	Particle World
RMP	Reviews of Modern Physics
RPP	Reports on Progress in Physics
RSI	Review of Scientific Instruments
SCI	Science
SJNP	Soviet Journal of Nuclear Physics (English translation of YF)
USP	Uspekhi Fizicheskikh Nauk (translated as PHYU)
YF	Yadernaya Fizika (translated as SJNP before 1993, and as PAN thereafter)
ZETFP	Pisma v Zhurnal Eksperimentalnoi i Teoreticheskoi Fiziki (translated as JETPL)
ZPHY	Zeitschrift für Physik

KINEMATIC VARIABLES

Following are abbreviations used with reactions to indicate the momenta or energies at which they are studied:

PLAB	beam momentum in the lab frame
TLAB	beam kinetic energy in the lab frame
ELAB	beam total energy in the lab frame
PLAB/N	beam momentum per nucleon in the lab frame
TLAB/N	beam kinetic energy per nucleon in the lab frame
ELAB/N	beam total energy per nucleon in the lab frame
ECM	total energy in the c.m. frame

ACCELERATORS

BEPC	Beijing e^+e^- collider (3.6 GeV Ecm)
BNL	Brookhaven AGS proton synchrotron (31 GeV/c Plab)
BNL-RHIC	Brookhaven relativistic heavy ion collider (100 GeV/n per beam)
CEBAF	CEBAF linear accelerator with continuous e^- beam (4.0 GeV Ecm)
CERN-LEAR	CERN Low-Energy Antiproton Ring
CERN-LEP	CERN Large Electron-Positron collider (90-180 GeV Ecm)
CERN-LHC	CERN Large Hadron Collider (14 TeV Ecm)
CERN-PBAR/P	CERN $\overline{p}p$ collider (900 GeV Ecm)
CERN-SPS	CERN Super Proton Synchroton (450 GeV/c Plab)
CESR	Cornell Electron-positron Storage Ring (16 GeV Ecm)
DESY-DORIS-III	DESY DORIS electron-positron double ring, 1991 upgrade
DESY-HERA	DESY HERA electron (27 GeV) – proton (820 GeV) collider
FNAL-COLLIDER	FNAL $\overline{p}p$ collider (2000 GeV Ecm)
FNAL-TEV	FNAL fix target Tevatron (1000 GeV)
FRASCATI-DAPHNE	e^+e^- storage ring and ϕ factory (1 GeV Ecm)
ITEP	ITEP Moscow proton synchrotron (7 GeV/c Plab)
JINR	JINR (Dubna) proton synchrotron (10 GeV/c Plab)
KEK	KEK proton synchrotron (12 GeV/c Plab)
KEK-B-FACTORY	KEK two-ring asymmetric B factory
KEK-TRISTAN	KEK electron-positron storage ring (60 GeV Ecm)
LAMPF	Los Alamos Meson/Proton Factory (1460 MeV/c Plab)
NOVO-VEPP-2M	Novosibirsk VEPP-2M electron-positron storage ring (1.4 GeV Ecm)
NOVO-VEPP-4M	Novosibirsk VEPP-4M electron-positron storage ring (7 GeV Ecm)
PNPI	Synchrocyclotron at St. Petersburg Inst. Nucl. Phys. (1 GeV Tlab)
PSI	Cyclotron at Paul Scherrer Institute (590 MeV Tlab)
SATURNE-II	Saclay Saturne-II p, d, and He synchrotron
SERPUKHOV	Serpukhov proton synchrotron (76 GeV/c Plab)
SERPUKHOV-UNK	Serpukhov multi-TeV proton machine
SLAC	Stanford electron linear accelerator (40 GeV/c Plab)
SLAC-PEP2	New SLAC Positron-Electron Project (asymmetric B factory)
SLAC-SLC	SLAC Linear e^+e^- Collider (100 GeV Ecm)
TRIUMF	Canadian TRIangle University Meson Facility (520 MeV Tlab)

DETECTORS

In searching the EXPERIMENTS database (SLAC/SPIRES) from which this report is taken, use the following abbreviations for general kinds of detectors:

CALO	calorimeter
CNTR	counter(s)
COMB	combination of various elements
DAS	double-arm spectrometer
DRIFT	drift chamber
EMUL	emulsion
IONIZATION	detector looking for ionization
MWPC	multiwire proportional chamber
PHOTON	photon spectrometer such as NaI or Ge detectors
PLASTIC	Lexan, etc., used like emulsion
PMT	various photomultiplier tubes
RICH	ring-imaging Čerenkov detector
SAS	single-arm spectrometer
SCINT	scintillator
SPEC	spectrometer system
STRC	streamer chamber
TRACK	tracking system
WIRE	wire chamber

We use the following acronyms for specific detectors (both in this Report and in the SLAC/SPIRES database):

ALEPH	CERN-LEP detector
ALPHA	JINR magnetic spectrometer system
AMY	KEK-TRISTAN high-resolution lepton detector
ARGUS	DESY-DORIS-II detector
ATLAS	CERN-LHC proposed detector
BABAR	SLAC-PEP2 proposed detector
BELLE	KEK-B-FACTORY proposed detector
BES	BEPC detector
BRAHMS	BNL-RHIC proposed Broad Range Hadron Magnetic Spectrometer
CCM	FNAL-TEV Chicago Cyclotron Magnet spectrometer
CDF	Collider Detector at Fermilab
CHARM-II	CERN-SPS upgrade of CHARM neutrino detector
CLAS	CEBAF Large Acceptance Spectrometer
CLEO	CESR spectrometer system
CMD-2	Novosibirsk upgrade of CMD detector
CMS	CERN-LHC proposed detector
CRYSTAL-BALL	SLAC-PEP, DESY-DORIS, BNL Crystal Ball large-solid-angle neutral detector
CRYSTAL-BARREL	CERN-LEAR large-solid-angle detector
DELPHI	CERN-LEP detector
D0	FNAL-COLLIDER detector
EMC	CERN-SPS European Muon Collaboration detector
EXCHARM	Serpukhov detector, upgrade of BIS-2M
GAMS-4000	CERN-SPS 64×64 cell Pb-glass array
GAMS-4PI	Serpukhov gamma spectrometer
GGNT	Baksan Gallium–Germanium Neutrino Telescope
HELIOS	CERN-SPS detector
HLBC-DIANA	ITEP heavy liquid bubble chamber
HLBC-SKAT	Serpukhov heavy liquid bubble chamber
HYPERON-II	Serpukhov single arm magnetic spectrometer
H1	DESY-HERA detector
ICARUS	Gran Sasso bubble chamber detector
ISTRA-M	Serpukhov detector

DETECTORS

JETSET	CERN-LEAR compact general purpose detector
KEDR	NOVO-VEPP-2M universal magnetic detector
KLOE	Frascati DAΦNE detector
LAB-E	FNAL-TEV target-calorimeter muon-spectrometer detector for neutrino physics
LAMBDAMETER	ITEP detector
LSND	LAMPF Liquid Scintillator Neutrino Detector
L3	CERN-LEP detector
MACRO	Gran Sasso detector
MEGA	LAMPF array of electron and photon spectrometers
MIS	Serpukhov multiparticle spectrometer
MIS-2	Serpukhov upgrade of MIS
MPS	BNL MultiParticle Spectrometer
MPS-II	BNL upgrade of MPS
MTS	ITEP detector
NEPTUN	Serpukhov-UNK jet target detector
NMS	LAMPF Neutral Meson Spectrometer
OMEGA	CERN, CERN-SPS spectrometer system
OMEGAPRIME	CERN-SPS spectrometer system
OPAL	CERN-LEP detector
PHENIX	BNL-RHIC photon, electron, and hadron detector, under construction
PHOBOS	BNL-RHIC two-arm multiparticle spectrometer, under construction
PINOT	Saclay high resolution pi0 and eta detector
QUARTZ	Serpukhov crystal-diffraction spectrometer
SINDRUM	PSI large-solid-angle magnetic detector
SINDRUM-II	PSI upgraded large-angle solenoid detector
SLD	SLAC-SLC detector
SND	Novosibirsk Spherical Neutral Detector
SPES-0	Saclay modular lead-glass Čerenkov detector
SPES-II	CERN, CERN-LEAR high-resolution spectrometer
SPES-III	Saclay high-resolution spectrometer
SPES-IV	Saclay high-resolution spectrometer
SPES4-PI	Saclay high-resolution spectrometer
SPHINX	Serpukhov detector, also known as SFINKS
STAR	BNL-RHIC solenoidal detector, under construction
TOKIWA	KEK-PS spectrometer
TOPAZ	KEK-TRISTAN solenoidal spectrometer with TPC
TPS	FNAL Tagged Photon Spectrometer
VENUS	KEK-TRISTAN Versatile Economical and Novel Universal Spectrometer
VES	Serpukhov magnetic VErtex Spectrometer
ZEUS	DESY-HERA detector

BEPC Experiments

BEPC-BES

(Began data-taking 1991, In progress)

MEASUREMENT OF THE τ LEPTON MASS WITH THE BEIJING SPECTROMETER (BES)

BES COLLABORATION

BEIJING, IHEP – J Z Bai, S M Chen, S J Chen, Y Q Cheng, Z D Cheng, H C Cui, X Z Cui, H L Ding, Z Z Du, C Fang, M L Gao, S Q Gao, W X Gao, Y N Gao, J H Gu, S D Gu, W X Gu, Y N Guo, Y Y Guo, Y Han, J He, G Y Hu, H B Hu, T Hu, D Q Huang, Y Z Huang, C H Jiang, Z J Jiang, Y F Lai, P F Lang, F Li, J Li (Spokesperson), P Q Li, Q M Li, R B Li, W D Li, W Li, W G Li, Y S Li, S Z Lin, H M Liu, Q Liu, R G Liu, Y Liu, J G Lu, D H Ma, E C Ma, J M Ma, H S Mao, Z P Mao, X C Meng, H L Ni, L J Pan, N D Qi, Y K Que, G Rong, Y Y Shao, D L Shen, H Y Sheng, H Z Shi, X F Song, H S Sun, G L Tong, L Z Wang, M Wang, P L Wang, P Wang, T J Wang, Y Y Wang, X D Wu, D M Xi, X M Xia, P P Xie, X X Xie, R S Xu, Z Q Xu, S T Xue, J Yan, W G Yan, C Y Yang, C M Yang, H B Yao, M H Ye, S Z Ye, Z Q Yu, B Y Zhang, C C Zhang, D H Zhang, H Y Zhang, H L Zhang, J W Zhang, L S Zhang, S Q Zhang, Y Zhang, D X Zhao, M Zhao, P D Zhao, W R Zhao, J P Zheng, L S Zheng, Z P Zheng, G P Zhou, H S Zhou, L Zhou, L Zhou, X F Zhou, Y H Zhou, Q M Zhu, Y S Zhu, Y C Zhu

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HAWAII U – A Breakstone, F Harris, S Olsen, D Paluselli

MIT, LNS – O Bardon, R Cowan, M Fero, J Quigley, E Torrence, R K Yamamoto

SLAC – R A Becker-Szendy, W M Dunwoodie, H Marsiske, E Soderstrom, J Synodinos, W J Wisniewski

TEXAS U, DALLAS – I Blum, J S Campbell, P Gratton, J M Izen, X Lou, B Lowery, J Standifird

UC, IRVINE – A J Lankford, M Mandelkern, M Schernau, B Schmid, J Schultz, A Smith, D P Stoker, G Zioulas

WASHINGTON U, SEATTLE – T Burnett, K Young

Accelerator BEPC *Detector* BES

Reactions

$e^+ e^- \rightarrow \tau^+ \tau^-$	3.6 GeV (E_{cm})

Particles studied τ

Brief description Uses non-collinear 2-prong $e\mu$ events with both e and μ identified. Measures the threshold behavior of the cross-section by scanning a very narrow range of energies, $3.544 < E_{cm} < 3.569$ GeV. The BES detector consists of a Muon Counter, TOF Counters, a Barrel Shower Counter and the main Drift Chamber. A major upgrade of the detector will be completed in the Fall 1996, and data-taking continued.

Journal papers NIM A308 (1991) 616, PRL 69 (1992) 3021, PL B355 (1995) 374 [erratum: PL B363 (1995) 267], PRL 74 (1995) 4599, PR D52 (1995) 3781, PR D53 (1996) 20, and PR D54 (1996) 1221.

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WWW Home-page
http://www-bes.slac.stanford.edu/beswww/bes.html

BEPC Future Plans

The upgrade of the BES spectrometer, which began in 1993, is nearing its completion, which promises new important physics results in the next few years at BEPC. The Lab is also actively involved in the design of the Beijing Tau Charm Factory (BTCF) which got positive reviews at home and abroad. BTCF was the main topic of a recent workshop in Beijing.

Selected BNL Experiments

BNL-787

(Proposed Sep 1983, Approved Oct 1983, Began data-taking Jun 1988, In progress)

A STUDY OF THE DECAY $K^+ \rightarrow \pi^+ \nu\bar{\nu}$

BROOKHAVEN – S Adler, M S Atiya, I H Chiang, M Diwan, J S Frank, E Garber, J S Haggerty, S H Kettell, T F Kycia, K K Li, L S Littenberg (√ Spokesperson), C F Ng, A Sambamurti, A J Stevens, R C Strand, C Witzig, Y Zhao

TOKYO U, INS – M Kazumori, T Komatsubara, M Kuriki, T Morimoto, N Muramatsu, H Okuno, K Omata, A Otomo, S Sugimoto, K Tauchi, K Ukai

KEK – M Aoki, T Inagaki, S Kabe, M Kobayashi, Y Kuno, T Sato, T Shinkawa, Y Yoshimura

OSAKA U – Y Kishi, T Nakano, T Sasaki

PRINCETON U – D Akerib, M Ardebili, M Convery, M M Ito, D R Marlow, R McPherson, P D Meyers, W Sands, M A Selen, F C Shoemaker, A J S Smith (√ Spokesperson), J R Stone

TRIUMF – P Bergbusch, E W Blackmore, D A Bryman (√ Spokesperson), M Burke, J V Cresswell, A Daviel, S Daviel, P Kitching, A Konaka, M LeNoble, J A Macdonald, J Mildenberger, T Numao, P Padley, J M Poutissou, R Poutissou, G Redlinger, J Roy, M Rozon, R Soluk, A S Turcot

Accelerator BNL *Detector* Spectrometer

Reactions

$K^+ \rightarrow \pi^+ \nu \bar{\nu}$	0 MeV/c (P_{lab})
$K^+ \rightarrow \pi^+ \mu^+ \mu^-$	"
$K^+ \rightarrow \mu^+ \mu^+ \mu^- \nu$	"
$K^+ \rightarrow \mu^+ \nu \gamma$	"
$K^+ \rightarrow \pi^+$ higgs	"
$K^+ \rightarrow \pi^+ \gamma \gamma$	"
$K^+ \rightarrow \pi^+$ X	"
$K^+ \rightarrow \pi^+ \pi^0 \gamma$	"
$\pi^0 \rightarrow \nu \bar{\nu}$	205 MeV/c (P_{lab})
$\pi^0 \rightarrow \gamma$ X	"
$\pi^0 \rightarrow \gamma \nu \bar{\nu}$	"

Particles studied K^+, higgs, nuino, π^0

Brief description A sensitivity down to a level of 1×10^{-10}, or better, is expected for $K^+ \rightarrow \pi^+ \nu\bar{\nu}$. A measurement at this level determines $|V_{td}|$, given that m_t is known. An observation significantly above this level would indicate a fourth generation of quarks and leptons, the presence of nuinos, or other new phenomena. A simultaneous measurement of $K^+ \rightarrow \pi^+ X$ to a sensitivity of about 2×10^{-11} is also expected. This probes the existence of axions, familons, hyperphotons, or other new particles. Other processes probe the existence of higgs, majorons, massive neutrinos, and other hypothetical particles. The first run was completed in June 91. Approved for 3000 additional hours with an upgraded beam and detector. The new beam (730 MeV/c K^+, stopped in spectrometer) was commissioned in 1992, the modified detector in 1994, and data was already collected with the new setup in 1995/96. Data taking is scheduled to resume in early 1997.

Journal papers NIM A279 (1989) 180, PRL 63 (1989) 2177, PRL 64 (1990) 21, PRL 65 (1990) 1188, NP (PROC SUPPL) 13 (1990) 568, PRL 66 (1991) 2189, NIM A321 (1992) 129, PRL 69 (1992) 733, PRL 70 (1993) 2521 [erratum: PRL 71 (1993) 305], PR D48 (1993) 1, PR D48 (1993) 1225, and PRL 76 (1996) 1421.

Related experiments N/A

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WWW Home-page http://www.phy.bnl.gov/e787/e787.html

SUMMARIES OF BROOKHAVEN EXPERIMENTS

BNL-821

(Proposed Sep 1985, Sep 1986, Approved Nov 1986, In preparation)

A NEW PRECISION MEASUREMENT OF THE $g_\mu - 2$ VALUE AT THE LEVEL OF 0.35 PPM

MUON (G-2) COLLABORATION

BOSTON U – D H Brown, R M Carey, W Earle, E Efstathiadis, E S Hazen, B J Hughes, F Krienen, J P Miller, O Rind, B L Roberts (√ Spokesperson), L R Sulak, W A Worstell
BROOKHAVEN – J T Benante, H N Brown, G Bunce, J R Cullen, G T Danby, C R Gardner, J M Geller, H Hseuh, J W Jackson, L- Jia, R Larsen, Y Y Lee, R E Meier, W Meng, W M Morse (√ Spokesperson), C Pai, I Polk, R Prigl, S Rankowitz, J Sandberg, Y Semertzidis, R Shutt, L Snydstrup, A Soukas, A Stillman, T Tallerico, P Thompson, F Toldo, K Woodle
CORNELL U – T Kinoshita, Y Orlov
FAIRFIELD U – D Winn
HEIDELBERG U, PHYS INST – J Gerhaeuser, A P Grossmann, K Jungmann, P von Walter, G zu Putlitz
HEIDELBERG, MAX PLANCK INST – U Haeberlen
ILLINOIS U, URBANA – P T Debevec, W Deninger, D W Hertzog, S A Sedykh, D C Urner
LBL & BROOKHAVEN – M A Green
MINNESOTA U – P B Cushman, S O Giron, J M Kindem, D E Maxam, D E Miller, C Timmermans, D Zimmerman
NOVOSIBIRSK, IYF – L M Barkov, D N Grigorev, B I Khazin, E A Kuraev, Y M Shatunov, E Solodov
TOKYO U – K Nagamine
SCIENCE U, TOKYO – Y Mizumachi
KEK – K Endo, H Hirabayashi, S Ichii, S Kurokawa, T Sato, A Yamamoto
WAKO, RIKEN – K Ishida
YALE U – S K Dhawan, F J M Farley, M Grosse-Perdekamp, V W Hughes (√ Spokesperson), D M Kawall, S I Redin

Accelerator BNL *Detector* Other

Reactions Polarized beam
muon → $e^{\pm}\ \nu\ \overline{\nu}$ 3.09 GeV/c

Particles studied muon

Brief description Measures the anomalous gyromagnetic ratio of the muon and provides a direct test of the Standard Model. Uses a 7-m-radius superferric muon storage ring with a 1.45-tesla vertical field. Approved for 2100 hours. The first data collection expected in FY 1997.

E-mail contact roberts@bu.edu, morse1@bnl.gov, vernon.hughes@yale.edu

WWW Home-page http://www.phy.bnl.gov/g2muon/home.html

BNL-840

(Proposed Jul 1987, Approved Oct 1987, Began data-taking Jul 1989, Completed data-taking Dec 1991)

SEARCH FOR THE COHERENT PRODUCTION OF LIGHT SCALAR AND PSEUDOSCALAR PARTICLES

ROCHESTER U – R Cameron, G Cantatore, A C Melissinos (√ Spokesperson), J T Rogers, G Ruoso, Y K Semertzidis
BROOKHAVEN – H Halama, D Lazarus, A G Prodell
FERMILAB – F A Nezrick
CERN & TRIESTE U – P Micossi, C Rizzo, E Zavattini

Accelerator NONE *Detector* Other

Particles studied axion

Brief description The detector used two CBA superconducting dipoles. Searched for light scalar or pseudoscalar particles that couple to the electromagnetic field. Looked for optical rotation of a polarized laser beam traversing in vacuum the 3.5 T magnetic field. The sensitivity of 10^{-10} rad corresponds to a limit on the coupling $g_{a\gamma\gamma}$ of 4×10^{-7} GeV^{-1}. Did not reach Delbruck scattering (real photons from virtual photons) below the e^+e^- threshold.

Journal papers PRL 64 (1990) 2988, JOSA B8 (1991) 520, PL A157 (1991) 125, PRL 69 (1992) 2333, ZPHY C56 (1992) 505, and PR D47 (1993) 3707.

Related experiments BNL-805

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BNL-852

(Proposed Jan 1989, Approved Mar 1989, Began data-taking Jun 1993, In progress)

SEARCH FOR MESONS WITH UNUSUAL QUANTUM NUMBERS

BROOKHAVEN – S U Chung (√ Spokesperson), R W Hackenburg, K Olchanski, D P Weygand, H J Willutzki
INDIANA U – B B Brabson, R R Crittenden, A R Dzierba, P C Figliozzi, J L Gunter, B Kern, R Lindenbusch, M McKerley, D R Rust, E B Scott, P T Smith, T Sulanke, S Teige
MASSACHUSETTS U, DARTMOUTH – Z Bar-Yam, J Cummings, J Dowd, P Eugenio, W Kern, E King
MOSCOW STATE U – E V Anoshina, L I Belzer, V A Bodyagin, A Demianov, A M Gribushin, O L Kodolova, V L Korotkikh, M A Kostin, N Kruglov, A I Ostrovidov, A S Proskuryakov, L I Sarycheva, N B Sinev, I N Vardanyan, A A Yershov
NOTRE DAME U – T Adams, J M Bishop, N M Cason (√ Spokesperson), E I Ivanov, J M LoSecco, J J Manak, A Sanjari, W D Shephard, D L Stienike, S A Taegar, D R Thompson
NORTHWESTERN U – D S Brown, T Pedlar, K K Seth, J Wise, D Zhao
SERPUKHOV – S Denisov, A Dushkin, V Kochetkov, V Lipaev, I Shein, A Soldatov
RENSSELAER POLY – G Adams, J Kuhn, J Napolitano, M Nozar, J Smith, D B White, M Witkowski, A M Wright

Accelerator BNL *Detector* MPS

Reactions

$\pi^- p \to n\ \eta\ \pi^0$	18 GeV/c
$\pi^- p \to n\ \eta\ \eta$	"
$\pi^- p \to p\ \eta\ \pi^-$	"
$\pi^- p \to p\ \eta'\ \pi^-$	"
$\pi^- p \to p\ \eta\ \pi^-\ \pi^+\ \pi^-$	"
$\pi^- p \to p\ \pi^-\ \pi^+\ \pi^-$	"
$\pi^- p \to n\ \eta\ \pi^0\ \pi^0$	"
$\pi^- p \to n\ \eta\ \pi^+\ \pi^-$	"
$\pi^- p \to n\ \eta\ \eta'$	"
$\pi^- p \to n\ K^0\ \overline{K}^0\ \pi^0$	"
$\pi^- p \to n\ K^0\ \overline{K}^0\ \pi^0\ \pi^0$	"
$\pi^- p \to n\ K^0\ \overline{K}^0\ \pi^+\ \pi^-$	"

Particles studied exotic-meson, glueball, hybrid

Brief description Looks in particular for further evidence of an "$M(1405)$", observed to decay into $\eta\pi^0$ in GAMS-spectrometer experiments at Serpukhov and CERN. Studies decay modes of mesons, with multiphotons and 0, 1, or 2 charged particles. The detector is built around MPS. An H_2 target is surrounded by a CsI veto. Other parts of the apparatus are a charged particle detector, a Čerenkov counter, and a 3000-element lead glass calorimeter. Approved for a total of 5000 hours. Taking data (July 96).

Journal papers NIM A332 (1993) 419, A342 (1994) 398, NIM A357 (1995) 95, and NIM A368 (1996) 617.

Related experiments SERPUKHOV-163, CERN-NA-012-2

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WWW Home-page
http://lemond.phy.bnl.gov/~e852/home_e852.html

BNL-865

(Proposed May 1990, Approved Jun 1990, Began data-taking 1995, In progress)

IMPROVED SEARCH FOR $K^+ \to \pi^+\mu^+e^-$

E865 COLLABORATION

BASEL U – G Backenstoss, W Menzel, H Weyer
BROOKHAVEN – D Lazarus, L Leipuner, H Ma, P Rehak
MOSCOW, INR – G S Atoyan, V V Isakov, O Karavichev, A A Poblaguev, V Postoev, I N Semeniouk
NEW MEXICO U – B Bassalleck, S W Eilerts, J Lowe, D Wolfe
PSI, VILLIGEN – J Egger, W D Herold, H Kaspar, J Missimer
PITTSBURGH U – R Appel, N E Cheung, C A Felder, H M Gach, D E Kraus, I G Ober, P A Pomianowski, A Sher, J A Thompson
TBILISI STATE U – Y S Bagaturia, D Mazavia, G V Melitauri, T M Sakhelashvili
YALE U – D R Bergman, H D Do, J A Lozano, W A Majid, M E Zeller (√ Spokesperson)
ZURICH U – S Pislak, P Robmann, P Truoel

Accelerator BNL *Detector* Spectrometer, Calorimeter

Reactions

$K^+ \to \pi^+ \mu^+ e^-$	6.0 GeV/c (P_{lab})
$K^+ \to \pi^+ e^+ e^-$	"
$K^+ \to \pi^+ \mu^+ \mu^-$	"
$K^+ \to \pi^+ \pi^0 e^+ e^-$	"
$K^+ \to \pi^+ \pi^- e^+ \nu$	"
$\pi^0 \to e^+ e^-$	—

Particles studied K^+, π^0

Brief description Continuation of BNL-777 experiment, with a factor of approximately 70 improved sensitivity. The main purpose is to observe, or place a limit of a few times 10^{-12}, on the branching ratio of the muon number violating decay $K^+ \to \pi^+\mu^+e^-$. Uses a magnetic spectrometer system with very high rate, and good particle identification. Aims at achieving significant improvements on measurements of rates and kinematic distributions of other rare decays (B.R. $< 10^{-4}$). Taking data (July 96).

Related experiments BNL-777

E-mail contact michael.zeller@yale.edu

WWW Home-page
http://130.132.48.201/www_info/e865/e865.html

BNL-871

(Proposed Sep 1990, Approved Nov 1990, Began data-taking Feb 1995, In progress)

A NEW SEARCH FOR VERY RARE K_L DECAYS

UC, IRVINE – V Abadjev, M G Bachman, D F Connor, P DeCecco, R M Djilibaev, N Kanematsu, R K Lee, W R Molzon (√ Spokesperson)
STANFORD U – C G Arroyo, K W Hartman, M J Hebert, G M Irwin, D Ouimette, M C Pommot Maia, S G Wojcicki (√ Spokesperson)
TEXAS U – D Ambrose, S C Graessle, K Lang, A Milder, J L Ritchie (√ Spokesperson), V Vassikakopoulos
WILLIAM AND MARY COLL – M Eckhause, A D Hancock, C Hoff, J R Kane (√ Spokesperson), Y Kuang, R D Martin, R E Welsh, E J Wolin
RICHMOND U – P D Rubin

Accelerator BNL *Detector* Spectrometer

Reactions

$K_L \to \mu^- e^+$	—
$K_L \to \mu^+ e^-$	—
$K_L \to \mu^+ \mu^-$	—
$K_L \to e^+ e^-$	—

Particles studied K_L

Brief description A search for the decays $K_L \to \mu e$ and $K_L \to ee$ with a sensitivity of 10^{-12}, and a measurement of the branching fraction for $K_L \to \mu\mu$. BNL-871 improves on the sensitivity of BNL-791 by more than a factor of ten. The detector consists of two dipoles, straw and wire drift chambers, scintillation and gas Čerenkov counters, a lead glass shower counter, and a muon rangefinder. A novel feature of the experiment is a shielded tungsten beam stop inside the spectrometer. Test data were taken in 1991/92, engineering runs were done in 1993/94, and the actual data taking began with a 5-month run in 1995. Approved for 7,000 hours. In progress (1996).

Related experiments BNL-791

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WWW Home-page http://www.ps.uci.edu/~e871/e871intro.html

BNL-881

(Proposed Jul 1991, Approved Aug 1991, In progress)

UTILIZING $\phi\phi$ SPECTROSCOPY TO SEARCH FOR EXOTIC GLUEBALLS, EXOTIC HYBRID, OR EXOTIC MULTIQUARK STATES

BROOKHAVEN & CITY COLL, NY – S J Lindenbaum (Spokesperson)
BROOKHAVEN – R W Hackenburg, R S Longacre
CITY COLL, NY – C S Chan, E Efstathiadis, M A Kramer, K Zhao, Y Zhu
CONNECTICUT U – M Gai
FERMILAB – K Vaziri
RENSSELAER POLY – G Adams, C Landberg, A M Perry, B Wojtsekhowski

Accelerator BNL *Detector* MPS-II

Reactions

$\pi^- p \to \phi \phi n$	8 GeV/c (P_{lab})
$\pi^- p \to \phi K^+ K^- n$	"
$\pi^- p \to K^+ K^- K^+ K^- n$	"
$K^- p \to \phi \phi \Lambda$	"
$K^- p \to \phi \phi \Sigma$	"
$K^- p \to \phi K^+ K^- \Lambda$	"
$K^- p \to \phi K^+ K^- \Sigma$	"
$K^- p \to K^+ K^- K^+ K^- \Lambda$	"
$K^- p \to K^+ K^- K^+ K^- \Sigma$	"
$\bar{p} p \to \phi \phi \pi^0$	"
$\bar{p} p \to \phi K^+ K^- \pi^0$	"
$\bar{p} p \to K^+ K^- K^+ K^- \pi^0$	"

Particles studied glueball, $f_2(2010)$, $f_2(2300)$, $f_2(2340)$

Brief description A search for exotic glueballs and exotic hybrids. Uses the MPS facility and the MESB beam at 8 GeV/c, tuned to contain π^-, K^-, and $\bar{p}$. Lowering the momentum to 8 GeV/c increases the rate of exchanges required to make exotics. Currently pausing (May 96).

E-mail contact lindenbaum@bnldag.bnl.gov

WWW Home-page
http://www.phy.bnl.gov/~e881/welcome_ags.html

BNL-909

(Proposed Oct 1994, Approved Nov 1994, Began data-taking Apr 1995, Completed data-taking May 1995)

ETA PRODUCTION AT THRESHOLD IN THE REACTIONS $\pi^-p \to \eta n$ AND $K^-p \to \Lambda\eta$

ABILENE CHRISTIAN U – L D Isenhower, A A Rose, M Sadler
BOŠKOVIĆ INST, ZAGREB – A Marušić, I Šlaus
BROOKHAVEN – R Chrien, R Sutter
DUBNA – A A Efendiev

GEORGE WASHINGTON U – C Bennhold, W J Briscoe (√ Spokesperson), T W Morrison, Z Papandreou, S A Philips, R Pratt, A Shafi
HOUSTON U – R Sawafta
RENSSELAER POLY – D B White
ST PETERSBURG, INP – V V Abaev, V Bekrenev
ST PETERSBURG, INP – N Kozlenko
UCLA – M Clajus, S C McDonald, B M K Nefkens, W B Tippens (√ Spokesperson)

Accelerator BNL *Detector* Spectrometer

Reactions

$\pi^- p \to \eta n$	680–760 MeV/c (P_{lab})
$K^- p \to \eta \Lambda$	"

Particles studied $N(1535\,S_{11})$, $\Lambda(1670\,S_{01})$

Brief description Measures the total cross-section, as well as angular distribution for η production from threshold (P = 685 MeV/c for pion, P = 723 MeV/c for kaon) up to 760 MeV/c. The η particles are detected via the 2γ decay mode using the improved η spectrometer. Data analysis in progress at GWU (July 96).

Related experiments BNL-890, BNL-913, BNL-914

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WWW Home-page
http://ucla5.phy.bnl.gov/htdocs/e909/e909.html

BNL-913-914

(Proposed Mar 1995, Approved Sep 1995, In preparation)

BARYON AND NEUTRAL HYPERON SPECTROSCOPY WITH THE CRYSTAL BALL

CRYSTAL-BALL COLLABORATION
ABILENE CHRISTIAN U – B Draper, J Huddleston, L D Isenhower, Z Mulkey, M E Sadler (√ Spokesperson)
ARGONNE – H Spinka (√ Spokesperson)
ARIZONA STATE U – J R Comfort, K Craig
BOŠKOVIĆ INST, ZAGREB – M Batinić, I Šlaus, I Supek, A Švarc
BROOKHAVEN – T Kycia (√ Spokesperson)
COLORADO U – R J Peterson
GEORGE WASHINGTON U – C Bennhold, W J Briscoe
KARLSRUHE U – H M Staudenmaier
KENT STATE U – D M Manley
ST PETERSBURG, INP – V V Abaev, V S Bekrenev, N G Kozlenko, S P Kruglov (√ Spokesperson), I V Lopatin, A B Starostin
REGINA U – G J Lolos, Z Papandreou
UCLA – M Clajus, A Marušić, S C McDonald, B M K Nefkens (√ Spokesperson), W B Tippens (√ Spokesperson)
VALPARAISO U, INDIANA – D Groznick, D D Koetke, R W Manweiler, S Stanislaus

Accelerator BNL *Detector* CRYSTAL-BALL

Reactions

$\pi^- p \to n \gamma$	400–1800 MeV/c
$\pi^- p \to \pi^0 n$	"
$\pi^- p \to \pi^0 \pi^0 n$	"
$\pi^- p \to \eta n$	685–1800 MeV/c
$\pi^- p \to \pi^0 \eta n$	1000–1800 MeV/c
$\pi^- p \to \omega n$	1100–1800 MeV/c
$K^- p \to \Lambda \gamma$	600–1800 MeV/c
$K^- p \to \Lambda \pi^0$	"
$K^- p \to \Lambda 2\pi^0$	"
$K^- p \to \Lambda \eta$	720–1800 MeV/c
$K^- p \to \Sigma^0 \gamma$	600–1800 MeV/c
$K^- p \to \Sigma^0 \pi^0$	"
$K^- p \to \Sigma^0 2\pi^0$	"
$K^- p \to \Sigma^0 \eta$	890–1800 MeV/c

Particles studied $N^*(\text{unspec})^0$, $\Delta(\text{unspec})^0$, $\Lambda(\text{unspec})$, $\Sigma(\text{unspec})^0$

Brief description Measures absolute differential cross-sections. Uses the Crystal Ball multiphoton spectrometer with large acceptance and high energy resolution. Various reaction channels are identified by reconstructing the invariant mass of the produced γ rays. The experiment has two distinct parts. The goal of BNL-913 is a better determination of the masses, widths, and decay modes of the excited states of the nucleon. The spokespersons are M.E. Sadler, H. Spinka and W.B. Tippens. BNL-914 studies the Λ^* and Σ^* resonances via their neutral decays. The incident beam momentum is varied in steps of $25-50$ MeV/c from 600 MeV/c in the C-line to the maximum momentum of 1.8 GeV/c in the D-line. The spokespersons are T. Kycia, S.P. Kruglov and B.M.K. Nefkens. Approved for 1000 hours. Scheduled to run in FY 1997.

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WWW Home-page
http://ucla5.phy.bnl.gov/htdocs/e913-914/e913-914.html

BNL-RHIC-BRAHMS

(Proposed 1992, Approved Apr 1995, In preparation)

THE BRAHMS EXPERIMENT AT RHIC

BRAHMS COLLABORATION

Accelerator BNL-RHIC *Detector* BRAHMS

Brief description RHIC provides an opportunity for experiments investigating both baryon poor quark gluon plasma in the midrapidity region and baryon rich plasma in the fragmentation regions of rapidity. The most basic information available for understanding the phenomena that occur in heavy ion collisions comes from the momentum spectra and yields of the various emitted particles as a function of transverse momentum and rapidity. One of the goals of the experiment is to measure the spectra of well identified charged hadrons over a wide range of rapidity and transverse momenta as a function of the centrality of the collision. Uses the BRAHMS (Broad RAnge Hadron Magnetic Spectrometers) detector, consisting of a magnetic forward angle hadron spectrometer and a midrapidity spectrometer. PAC approved in Apr 95. For further details, please contact the Spokesperson, Dr. Flemming Videbaek [BNL], or get in touch with Dr. Dana Beavis [BNL].

E-mail contact videbaek@bnl.gov, beavis@bnl.gov

WWW Home-page
http://rsgi01.rhic.bnl.gov/export1/brahms/WWW/brahms.html

BNL-RHIC-PHENIX

(Proposed 1989, In preparation)

PHOTON–ELECTRON NEW HEAVY ION EXPERIMENT

PHENIX COLLABORATION

Accelerator BNL-RHIC *Detector* PHENIX

Brief description Studies simultaneously various signatures of quark–gluon plasma in heavy ion collisions. Focuses specifically on the measurement of leptons, photons, and identified hadrons, and should be capable of exploiting the highest luminosities envisioned for RHIC. Studies also asymmetries of photons and leptonic decays of weak bosons in polarized proton reactions. The PHENIX detector system is based on an axial field magnet in which the central rapidity interval is covered by two detector arms, each subtending 90° in azimuth. The aperture is instrumented to detect electrons, photons, and hadrons. Two muon arms, covering polar angles subtending 30° (forward and backward), have a good acceptance for muon pairs and allow also electron–muon coincidence measurements. An event multiplicity array to cover over five rapidity units is used for

event characterization. Under construction (July 96). The collaboration consists of over 420 scientists, engineers, and graduate students from 45 participating institutions in 10 countries. For further details, please contact the Spokesperson, Prof. Shoji Nagamiya [Columbia U.].

E-mail contact nag@nevis.nevis.columbia.edu

WWW Home-page
http://rsgi01.rhic.bnl.gov/~phenix/phenix_home.html

BNL-RHIC-PHOBOS

(Proposed Jan 1992, Approved Nov 1992, In preparation)

PROPOSAL TO STUDY VERY LOW $p_\perp$ PHENOMENA AT RHIC

PHOBOS COLLABORATION

Accelerator BNL-RHIC *Detector* PHOBOS

Brief description The experiment is based on the premise that phase transitions may be signaled by large fluctuations in the overall multiplicity or angular distribution of charged particles. An outer 4π detector measures multiplicity and pseudorapidity. A small subset of particles around $y = 0$ is then studied in detail by a two-arm multiparticle spectrometer with good momentum resolution and particle identification. The detector is based on silicon technology and allows unbiased triggering at very high rates. In preparation (July 96). For further details, please contact the Spokesperson, Prof. Wit Busza [MIT].

E-mail contact busza@mit.edu

WWW Home-page
http://www.rhic.bnl.gov/phobos/common/WWW/phobos.html

BNL-RHIC-PP2PP

(Proposed Jan 1994, Approved Mar 1994, In preparation)

TOTAL AND DIFFERENTIAL CROSS-SECTIONS, AND POLARIZATION EFFECTS IN pp ELASTIC SCATTERING AT RHIC

PP2PP COLLABORATION

Accelerator BNL-RHIC *Detector* ?

Brief description Studies systematically the pp elastic scattering from $\sqrt{s}$ = 60 GeV to $\sqrt{s}$ = 500 GeV, in two kinematical regions. In the Coulomb Nuclear Interference (CNI) region, for $|t|$ between 0.0005 and 0.12 $(\mathrm{GeV}/c)^2$, measures (1) the s dependence of the total and elastic cross-sections, σ_{tot} and σ_{el}, (2) the ratio of the real to the imaginary part of the forward elastic scattering amplitude, and (3) the nuclear slope parameter of the pp elastic scattering, b. In the intermediate $|t| \leq 1.5$ $(\mathrm{GeV}/c)^2$, studies the evolution of the dip structure with s, and the s and $|t|$ dependence of b. The possibility of having polarized proton beams at RHIC would allow measurements of (i) the difference in the total cross-sections as a function of initial transverse spin states, (ii) the analyzing power, A_N, especially in the dip region where a pronounced structure was found at fixed-target experiments, and (iii) the transverse spin correlation parameter, A_{NN}. Under construction (July 96). For further details, please contact the Spokesperson, Dr. Wlodek Guryn [BNL].

E-mail contact guryn@bnl.gov

BNL-RHIC-STAR

(Proposed 1990, Approved Aug 1991, In preparation)

SOLENOIDAL TRACKER AT RHIC (STAR)

STAR COLLABORATION

Accelerator BNL-RHIC *Detector* STAR

Brief description STAR is designed to search for signatures of quark–gluon plasma formation and to investigate the behavior of strongly interacting matter at high energy density. The emphasis is on the measurement and correlation of global observables on an event-by-event basis and the use of hard scattering of partons to probe the properties of high density nuclear matter. The event-by-event measurement of global observables is possible because of the very high charged particle densities ($\mathrm{d}n/\mathrm{d}y$ about 1000) expected at mid-rapidity in nucleus–nucleus collisions at RHIC. To fulfill the physics objectives, the experiment will provide tracking, momentum analysis, and particle identification of most of the charged particles at mid-rapidity. The baseline STAR detector includes a time projection chamber (TPC) in a solenoidal magnetic field of 0.5 T, covering approximately 4 units of the central rapidity. The cylindrical TPC is four meters in diameter. Ionization charge produced along particle trajectories is drifted to the two end plates, where induced signals and arrival times are read out on 150,000 cathode pads. Particle identification will be possible via $\mathrm{d}E/\mathrm{d}x$ in the $1/\beta^2$ region. Upgrades being developed for STAR include an array of TOF counters to extend the PID capabilities to higher momenta, an electromagnetic calorimeter to provide for the measurement of neutral energy, and a silicon vertex detector which uses position sensitive silicon devices with a drift-time measurement technique. A further upgrade using TPC's in the forward direction will extend the particle tracking coverage to a pseudorapidity of approximately ± 4. PAC approved August 91. In preparation (July 96). For further details, please contact the Spokesperson, Prof. John W. Harris [Yale U.]. Project Director is Dr. Jay N. Marx [LBL], and Deputy Spokesperson Dr. Timothy J. Hallman [BNL].

Journal papers NP A566 (1994) 277c.

E-mail contact jwharris@lbl.gov, jnmarx@lbl.gov, tjhallman@lbl.gov

WWW Home-page
http://rsgi01.rhic.bnl.gov/star/starlib/doc/www/star.html

Other BNL Experiments

Listed here are some other BNL experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. Check also the annual Brookhaven report 'AGS Experiments' (BNL-34518), or visit the Web sites: http://www.rhichome.bnl.gov/AGS/ (for the AGS experiments), or http://www.rhic.bnl.gov/ (for the RHIC experiments)

BNL-774 (Completed data-taking 1991)

SEARCH FOR Σ HYPERNUCLEAR LEVELS IN ^{4}He

Spokesperson: E.V. Hungerford [Houston U.]

E-mail contact hunger@uh.edu

BNL-781 (Completed data-taking 1992)

SPIN DEPENDENCE OF THE Λ – NUCLEUS INTERACTION DETERMINED BY OBSERVATION OF HYPERNUCLEAR γ RAYS

Spokespersons: M. May [Brookhaven], M. Deutsch [MIT]

E-mail contact may2@bnl.gov, deutsch@mitlns.mit.edu

BNL-810 (Completed data-taking 1992)

A SEARCH FOR QUARK MATTER (QGP) AND OTHER NEW PHENOMENA UTILIZING HEAVY ION COLLISIONS AT THE AGS

Spokespersons: E.D. Platner [Brookhaven], S.J. Lindenbaum [Brookhaven and City Coll., N.Y.]

E-mail contact platner@bnldag.bnl.gov, lindenbaum@bnldag.bnl.gov

SUMMARIES OF BROOKHAVEN EXPERIMENTS

BNL-813 (Completed data-taking Jun 1995)

SEARCH FOR A STRANGENESS −2 DIBARYON

Spokespersons: G.B. Franklin [Carnegie Mellon U.], P.D. Barnes [Los Alamos]

E-mail contact franklin@ernest.phys.cmu.edu, pdbarnes@lanl.gov

BNL-814 (Completed data-taking 1992)

STUDY OF EXTREME PERIPHERAL COLLISIONS AND OF THE TRANSITION FROM PERIPHERAL TO CENTRAL COLLISIONS IN REACTIONS INDUCED BY RELATIVISTIC HEAVY IONS

Spokesperson: Peter Braun-Munzinger [SUNY, Stony Brook]

E-mail contact pbm@skipper.physics.sunysb.edu

BNL-817 (Taking data)

POLARIZATION TRANSFER IN HYPERON PRODUCTION

Spokespersons: Billy E. Bonner, Jay B. Roberts [Rice U.]

E-mail contact bonner@physics.rice.edu

BNL-836 (Completed data-taking Jul 1994)

SEARCH FOR A STRANGENESS −2 DIBARYON USING A ^{3}He TARGET

Spokespersons: G.B. Franklin [Carnegie Mellon U.], P.D. Barnes [Los Alamos]

E-mail contact franklin@ernest.phys.cmu.edu, pdbarnes@lanl.gov

BNL-844 (In preparation)

MEASUREMENT OF ANGULAR DISTRIBUTIONS FOR FRAGMENTS IN THE TARGET RAPIDITY REGION

Spokesperson: James B. Cumming [Brookhaven]

E-mail contact cumming@bnl.gov

BNL-849 (Completed data-taking 1992)

SEARCH FOR MUONIUM TO ANTIMUONIUM CONVERSION

Spokespersons: Dale Richard Harshman, A.P. Mills, Jr. [A T and T Bell Labs, Murray Hill]

BNL-850 (Taking data)

EVA, A SOLENOIDAL DETECTOR FOR LARGE ANGLE EXCLUSIVE REACTIONS: PHASE I — DETERMINING COLOR TRANSPARENCY TO 22 GeV/c

Spokespersons: A.S. Carroll [Brookhaven], S. Heppelmann [Penn State U.]

E-mail contact carroll1@bnl.gov, heppel@phys.psu.edu, heppelmann@bnldag.bnl.gov

WWW Home-page
http://www.phys.psu.edu/LEPS/EVA/eva.html

BNL-854 (Completed data-taking Jun 1991)

ANTIPROTON–NUCLEUS INTERACTIONS AT 5–10 GeV/c

Spokesperson: B.E. Bonner [Rice U.]

E-mail contact bonner@physics.rice.edu

BNL-859 (Completed data-taking 1992)

STUDIES OF HIGH DENSITY BARYON MATTER FROM EXTENDED MEASUREMENTS OF PARTICLE MOMENTUM DISTRIBUTIONS AND FROM HIGH PRECISION TWO-PARTICLE CORRELATIONS

Spokespersons: Louis P. Remsberg [Brookhaven], William A. Zajc [Columbia U.], Robert J. Ledoux [MIT]

E-mail contact remsberg@nc6.chm.bnl.gov, zajc@nevis.nevis.columbia.edu

BNL-863 (Completed data-taking Sep 1993)

PARTICLE PRODUCTION AND NUCLEAR FRAGMENTATION IN COLLISIONS OF HEAVY IONS IN NUCLEAR TARGETS AT AGS ENERGIES

By EMU01 Collaboration

Spokespersons: Ingvar Otterlund [Lund U.], R.Jeffrey Wilkes [Washington U., Seattle]

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WWW Home-page http://marge.phys.washington.edu/emu01/

BNL-864 (In preparation)

PRODUCTION OF RARE COMPOSITE OBJECTS IN RELATIVISTIC HEAVY ION COLLISIONS

Spokespersons: Richard D. Majka, Jack Sandweiss [Yale U.]

E-mail contact jack.sandweiss@yale.edu

WWW Home-page
http://rhic2.physics.wayne.edu/le864/e864.html

BNL-866 (Completed data-taking Jan 1996)

STUDIES OF PARTICLE PRODUCTION AT HIGH BARYON DENSITY USING THE Au BEAM

By E-802 Collaboration

Spokespersons: Chellis Chasman [Brookhaven], Steve G. Steadman [MIT], Hideki Hamagaki [Tokyo U., INS]

E-mail contact chasman@hi0.hirg.bnl.gov, sgs@mitlns.mit.edu, hamagaki@insuty.ins.u-tokyo.ac.jp

WWW Home-page
http://marie.mit.edu/server/e866/E866Main.html

BNL-868 (Completed data-taking Dec 1995)

INTERACTIONS OF 14.1 GeV/NUCLEON NUCLEI FROM ^{16}O TO ^{197}Au IN LIGHT AND HEAVY TARGETS

By KLMM Collaboration

Spokesperson: C.J. Waddington [Minnesota U.]

E-mail contact waddington@uhn.spa.umn.edu

BNL-869

MEASUREMENT OF FRAGMENT YIELDS FOR 14 GeV/NUCLEON $Au + X$ COLLISIONS

By UHIC Collaboration

Spokesperson: C.Jake Waddington [Minnesota U.]

E-mail contact waddington@uhn.spa.umn.edu

WWW Home-page http://www.srl.caltech.edu/uhic/

BNL-874 (Completed data-taking Jun 1993)

KAON–NUCLEUS QUASIELASTIC AND ELASTIC SCATTERING

Spokespersons: Robert E. Chrien [Brookhaven], Roy Jerome Peterson [Colorado U.], E.V. Hungerford [Houston U.]

E-mail contact chrien@bnl.gov, peterson@spectr.colorado.edu, hunger@uh.edu

SUMMARIES OF BROOKHAVEN EXPERIMENTS

BNL-875 (Completed data-taking Aug 1993)

STUDY OF PARTICLE PRODUCTION AND NUCLEAR FRAGMENTATION IN RELATIVISTIC HEAVY-ION COLLISIONS IN NUCLEAR EMULSIONS

Spokesperson: P.L. Jain [SUNY, Buffalo]

E-mail contact phyjain@ubvms.cc.buffalo.edu

BNL-877 (Completed data-taking Dec 1995)

STUDY OF RELATIVISTIC NUCLEAR COLLISIONS WITH HEAVY BEAMS USING THE E814 CALORIMETRY AND MODIFIED FORWARD SPECTROMETER

Spokesperson: Peter Braun-Munzinger [SUNY, Stony Brook]

E-mail contact pbm@skipper.physics.sunysb.edu

WWW Home-page
http://skipper.physics.sunysb.edu/~e877/Home.html

BNL-878 (Completed data-taking Oct 1993)

INVESTIGATION OF ANTINUCLEUS PRODUCTION AND SEARCH FOR NEW PARTICLES IN NUCLEUS–NUCLEUS COLLISIONS AT THE AGS

Spokesperson: H.J. Crawford [UC, Berkeley, Space Sci.]

E-mail contact hjcrawford@lbl.gov, crawford@bnldag.bnl.gov

WWW Home-page http://aquila.lbl.gov/bnl878/home_e878.html

BNL-882 (Completed data-taking Oct 1994)

SEARCH FOR PARTICLES WITH $|Z| > 3$ AND NEGATIVE CHARGE OR LARGE A/Z PRODUCED IN CENTRAL NUCLEUS–NUCLEUS COLLISIONS

Spokesperson: P.Buford Price [UC, Berkeley]

E-mail contact pbprice@lbl.gov, yudong@physics.berkeley.edu

BNL-885 (In preparation)

EXPERIMENT TO DETECT $\Lambda\Lambda$ HYPERNUCLEI

Spokespersons: M. May [Brookhaven], G.B. Franklin [Carnegie Mellon U.], Charles A. Davis [Manitoba U. and TRIUMF]

E-mail contact may2@bnl.gov, franklin@ernest.phys.cmu.edu, cymru@triumf.ca

BNL-886 (Completed data-taking Oct 1993)

SEARCH FOR NEW PARTICLES IN NUCLEUS–NUCLEUS COLLISIONS

Spokespersons: Kenichi Imai [Kyoto U.], Philip H. Pile [Brookhaven], G. Diebold [Yale U.]

E-mail contact imai@kekvax.kek.jp, pile@bnl.gov

BNL-887 (Completed data-taking 1995)

DO NARROW Σ HYPERNUCLEAR STATES EXIST?

Spokespersons: Reyad Sawafta [Brookhaven], Kenneth H. Hicks [Ohio U.]

E-mail contact sawafta@bnldag.bnl.gov, hicks@ouvaxa.cats.ohiou.edu

BNL-888 (Completed data-taking Jul 1992)

SEARCH FOR THE H DIBARYON

Spokespersons: R.D. Cousins [UCLA], Alan J. Schwartz [Princeton U.]

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BNL-890 (Completed data-taking Jun 1995)

TEST OF CHARGE SYMMETRY IN η PRODUCTION ON DEUTERIUM

Spokespersons: Robert E. Chrien [Brookhaven], J.C. Peng [Los Alamos], Bernard M.K. Nefkens [UCLA]

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WWW Home-page
http://ucla5.phy.bnl.gov/htdocs/e890/e890.html

BNL-891 (In preparation)

A SEARCH FOR QUARK MATTER (QGP) AND OTHER NEW PHENOMENA UTILIZING Au Au COLLISIONS AT THE AGS

Spokesperson: E.D. Platner [Brookhaven]

E-mail contact platner@bnldag.bnl.gov

WWW Home-page http://www.phy.bnl.gov /usr1/people/e891/doc/www/welcome_e891.html

BNL-892 (In preparation)

ELECTRON CAPTURE FROM PAIR PRODUCTION

Spokesperson: Harvey Gould [LBL, Berkeley]

E-mail contact hagould@lbl.gov

WWW Home-page http://www.ags.bnl.gov/~e892/

BNL-895 (Taking data)

EXCLUSIVE STUDY OF NUCLEAR COLLISIONS AT THE AGS

Spokesperson: Gulshan Rai [LBL, Berkeley]

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WWW Home-page http://cnr2.kent.edu/~e895/

BNL-896 (In preparation)

SEARCH FOR A SHORT-LIVED H_0 DIBARYON AND SHORT-LIVED STRANGE MATTER, AND STUDY OF HYPERON PRODUCTION IN 11.6 A GeV/c Au Au COLLISIONS

Spokespersons: Henry J. Crawford [UC, Berkeley, Space Sci.], Tim J. Hallman [UCLA]

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WWW Home-page http://aquila.lbl.gov/bnl896/home_e896.html

BNL-900 (Completed data-taking Apr 1996)

ENERGY DISSIPATION AND MULTIFRAGMENTATION IN $p+A$ REACTIONS BETWEEN 2 AND 24 GeV/c

Spokespersons: Kris Kwiatkowski, Victor E. Viola [Indiana U.]

E-mail contact kwiat@iucf.indiana.edu, vicv@iucf.indiana.edu

BNL-905 (Taking data)

SEARCH FOR A Σ HYPERNUCLEAR BOUND STATE IN ^{4}He($K^-, \pi^\pm$) REACTIONS

Spokesperson: Tomofumi Nagae [Tokyo U., INS]

E-mail contact tomofumi.nagae@kek.jp

BNL-906 (In preparation)

EXPERIMENT TO DETECT DOUBLE-Λ HYPERNUCLEI BY OBSERVING CHARACTERISTIC π^- MESONIC DECAY

Spokespersons: Robert Chrien [Brookhaven], Tomokazu Fukuda [Tokyo U., INS]

E-mail contact chrien@bnl.gov, fukuda@insie1.ins.u-tokyo.ac.jp

BNL-907 (Taking data)

INVESTIGATION OF LIGHT HYPERNUCLEI USING $(K^-[\text{stop}], \pi^0)$ REACTION

Spokespersons: Ed V. Hungerford [Houston U.], Jen-Chieh Peng [Los Alamos]

E-mail contact hunger@uh.edu, peng@lanl.gov

BNL-910 (Taking data)

FACILITY TO STUDY PROTON–NUCLEUS AND HEAVY ION COLLISIONS USING A LARGE ACCEPTANCE DETECTOR WITH PARTICLE IDENTIFICATION CAPABILITIES

Spokesperson: Brian A. Cole [Columbia U.]

E-mail contact cole@nevis.columbia.edu

WWW Home-page
http://nevis1.nevis.columbia.edu/heavyion/e910/

BNL-917 (In preparation)

HIGH DENSITY BARYON MATTER USING RARE PROBES

Spokespersons: Alice Mignerey [Maryland U.], R.K. Seto [UC, Riverside]

E-mail contact richard.seto@ucr.edu

BNL Future Plans

The physics program at the Lab is centered around the AGS and RHIC facilities. For the next few years, the AGS proton program will continue to emphasize the search for rare and forbidden K decays, the measurement of $g-2$ for the muon, and studies of exotic mesons in the Multi-Particle Spectrometer. The heavy ion program will emphasize the search for the (strangeness -2) H dibaryon and searches for strange baryonic fragments with anomalous charge/mass ratios (strangelets). An AGS-2000 Workshop took place in the spring of 1996. Its focus was on the competitive, leading-edge physics which can make use of the 10^{14} protons per pulse which will be available at the AGS. Among the experiments under consideration were a study of $K^0 \rightarrow \pi^0\nu\bar{\nu}$, $\mu \rightarrow e$ conversion, polarization in $K_{\mu 3}$, and searches for low-mass gluino–gluino bound states. It is anticipated that the core of the AGS program beyond the year 2000 will develop from these and other Workshop efforts. The RHIC construction project is well underway. The current schedule calls for the first circulating and accelerating beams by the beginning of 1999, and the first physics runs later that year.

Selected CEBAF Experiments

CEBAF-89-024

(Proposed 1987, Approved 1989, In preparation)

RADIATIVE DECAYS OF LOW-LYING HYPERONS

CLAS COLLABORATION
RICE U – S Ahmad, B E Bonner, G S Mutchler (√ Spokesperson), S Taylor
WILLIAM AND MARY COLL – M Eckhause, A D Hancock, J R Kane, Y N Kuang, R E Welsh

Accelerator CEBAF *Detector* CLAS

Reactions

$\gamma\, p \rightarrow K^+\, Y^*$(unspec)	1.40 – 3.02 GeV (E_{lab})

Particles studied $\Lambda(1405\, S_{01})$, $\Lambda(1520\, D_{03})$, $\Sigma(1385\, P_{13})^0$

Brief description Measures the electromagnetic branching ratios of low-lying excited hyperons, $\Lambda(1405)$, $\Lambda(1520)$ and $\Sigma^0(1385)$. Uses the CLAS detector, a superconducting toroidal spectrometer with drift chambers and TOF scintillators. Determines the four-momentum of the excited hyperon from the energy of the tagged photon and K^+ momentum. The four-momentum of Λ (from the $Y^* \rightarrow \Lambda\gamma$ decay) can be reconstructed from the proton and π^- momentum. A good mass resolution with CLAS allows the suppression of the background due to π^0 decays. Uses a tagged photon beam and an LH2 target. Approved for 60 days of running in Hall B. Expected to run in Summer and Fall 1997.

Related experiments CEBAF-89-004, BNL-811

E-mail contact mutchler@physics.rice.edu

CEBAF-89-038

(Proposed Oct 1989, Approved May 1990, In preparation)

MEASUREMENT OF $p(e,e'\pi^+)n$, $p(e,e'p)\pi^0$, AND $n(e,e'\pi^-)p$ IN THE SECOND AND THIRD RESONANCE REGIONS

N* COLLABORATION
CEBAF – W Brooks, V D Burkert (√ Spokesperson), D Joyce, B A Mecking, M Mestayer, B B Niczyporuk, E Smith, A Yegneswaran
CHRISTOPHER NEWPORT U – D Doughty, D Heddle, Z J Li
DUKE U – H R Weller
FLORIDA STATE U – L C Dennis, P Dragovitsch, K W Kemper
FRASCATI – N Bianchi, G P Capitani, E De Sanctis, P Levi-Sandri, V Muccifora, E Polli, A R Reolon, P Rossi
INFN, GENOA – M Anghinolfi, P Corvisiero, G Gervino, L Mazzaschi, V Mokeev, G Ricco, M Ripani, M Sanzone, M Taiuti, A Zucchiatti
GEORGE MASON U – B J Lieb
JAMES MADISON U – K Giovanetti
KENT STATE U – D Keane, D M Manley
PITTSBURGH U – S A Dytman
RENSSELAER POLY – G S Adams, N C Mukhopadhyay, P Stoler
VIRGINIA U – D B Day, J S McCarthy, R C Minehart (√ Spokesperson), D Počanić, O A Rondon-Aramayo, R Sealock, L C Smith, S T Thornton, H J Weber
VIRGINIA STATE U – C E Stronach
VIRGINIA TECH – R A Arndt, D A Jenkins, L D Roper
WILLIAM AND MARY COLL – C E Carlson, H O Funsten, T Y Tung
CONNECTICUT U – M Gai (√ Spokesperson)

Accelerator CEBAF *Detector* CLAS

Reactions

$e^-\, p \rightarrow e^-\, p\, \pi^0$	2.0, 4.0 GeV (T_{lab})
$e^-\, p \rightarrow e^-\, n\, \pi^+$	"
$e^-\, p \rightarrow e^-\, p\, p\, \pi^-$	"

Particles studied $N(1535\, S_{11})$, $N(1520\, D_{13})$, $N(1680\, F_{15})$, $N(1440\, P_{11})$

Brief description The experiment will measure transition form-factors to nucleon excited states in the mass region from 1350 to 1800 MeV/c^2. Scheduled to run in Hall B in 1997.

Related experiments CEBAF-89-037, CEBAF-89-040, CEBAF-89-042, CEBAF-89-043, CEBAF-91-002, CEBAF-93-036

E-mail contact burkert@cebaf.gov, minehart@virginia.edu, gai@uconnvm.uconn.edu

CEBAF-89-039

(Proposed Oct 1989, Approved 1989, In preparation)

AMPLITUDES FOR THE $N(1535\, S_{11})$ AND $N(1710\, P_{11})$ RESONANCES FROM THE $ep \rightarrow ep\eta$ SCATTERING

CLAS COLLABORATION
CEBAF – V D Burkert, D Cords, D Joyce, B A Mecking, M Mestayer, B B Niczyporuk, E Smith, A Yegneswaran
CHRISTOPHER NEWPORT U – D Doughty, L Elouadrhiri, D Heddle
DUKE U – R Chasteler, D R Tilley, H Weller
FLORIDA STATE U – L C Dennis, P Dragovitsch, K W Kemper
GEORGE MASON U – B J Lieb
FRASCATI – N Bianchi, G P Capitani, E De Sanctis, P Levi-Sandri, V Muccifora, E Polli, A R Reolon, P Rossi
GENOA U & INFN, GENOA – M Anghinolfi, P Corvisiero, G Gervino, L Mazzaschi, V I Mokeev, G Ricco, M Ripani, M Sanzone, M Taiuti, A Zucchiatti
JAMES MADISON U – K Giovanetti (√ Spokesperson)
KENT STATE U – D M Manley
PITTSBURGH U – S A Dytman (√ Spokesperson), J Mueller, D Tedeschi, R Thompson
RENSSELAER POLY – G S Adams, N C Mukhopadhyay, J Napolitano, J Price, P Stoler
VIRGINIA U – D B Day, R Marshall, J S McCarthy, R C Minehart, D Počanić, O A Rondon-Aramayo, R Sealock, S T Thornton, H J Weber
VIRGINIA STATE U – C E Stronach
VIRGINIA TECH – R A Arndt, D A Jenkins, L D Roper
WILLIAM AND MARY COLL – C E Carlson, H O Funsten, T Y Tung
YALE U – M Gai

Accelerator CEBAF *Detector* CLAS

Reactions

$e^-\, p \rightarrow e^-\, p\, \eta$	2, 4 GeV (T_{lab})

Particles studied $N(1535\, S_{11})$, $N(1710\, P_{11})$, N^*(unspec)

Brief description Covers the total center-of-mass energies, W, from 1.35 to 1.9 GeV for the second resonance region, and from 1.49 to 1.9 GeV for the η channel. Uses a simple hydrogen gas target. Scheduled to run in Hall B.

E-mail contact giovankl@vax1.jmu.edu, dytman@vms.cis.pitt.edu

WWW Home-page http://www.cebaf.gov/clas/CLAS.html

CEBAF-89-043

(Proposed Oct 1989, Approved 1989, In preparation)

MEASUREMENTS OF THE ELECTROPRODUCTION OF THE Λ, $\Lambda(1520)$, AND $f_0(975)$ VIA THE K^+K^-p AND THE $K^+\pi^-p$ FINAL STATES

ABILENE CHRISTIAN U – D Isenhower, M Sadler
MIT, BATES LINEAR ACCELERATOR – L Ghedira
CEBAF – V D Burkert, D Joyce, B A Mecking, M Mestayer, B B Niczyporuk, E Smith, R R Whitney, A Yegneswaran
CARNEGIE MELLON U – R A Schumacher
CHRISTOPHER NEWPORT U – D Doughty
FLORIDA STATE U – L C Dennis (Spokesperson), K W Kemper
GEORGE MASON U – B J Lieb
GEORGE WASHINGTON U – A Mokhtari
JAMES MADISON U – K Giovanetti

KANSAS STATE U – T R Donoghue
KENT STATE U – D Keane, D M Manley
MIT – W Y Kim
PITTSBURGH U – S A Dytman
RENSSELAER POLY – G S Adams, N C Mukhopadhyay, P Stoler
VIRGINIA U – D B Day, R Marshall, J S McCarthy, R C Minehart, O A Rondon-Aramayo, R Sealock, S T Thornton, H J Weber
VIRGINIA STATE U – C E Stronach
VIRGINIA TECH – R A Arndt, D A Jenkins, L D Roper
WILLIAM AND MARY COLL – C E Carlson, H O Funsten (Spokesperson), C F Perdrisat
YALE U – M Gai

Accelerator CEBAF *Detector* CLAS

Reactions

$e^- p \to e^- X$	4 GeV (T_{lab})

Particles studied $f_0(980)$, $\Lambda(1520\, D_{03})$

Brief description Studies exclusive electroproduction and charged hadronic decay of the $f_0(980)$ resonance and low-mass Λ's. Scheduled to run in Hall B.

E-mail contact larry@fsulcd.physics.fsu.edu, funsten@cebaf.gov

CEBAF-91-002

(Proposed Sep 1991, Approved Nov 1991, Jan 1995, In preparation)

THE STUDY OF EXCITED BARYONS AT HIGH MOMENTUM TRANSFER WITH THE CLAS SPECTROMETER

N* COLLABORATION
CEBAF – V D Burkert (√ Spokesperson), B A Mecking, M Mestayer, B B Niczyporuk, E Smith, B Wojtsekhowski, A Yegneswaran
CHRISTOPHER NEWPORT U – D Doughty, D Heddle, Z J Li
CONNECTICUT U – M Gai
DUKE U – R Chasteler, D R Tilley, H R Weller
FLORIDA STATE U – L C Dennis, P Dragovitsch
FRASCATI – N Bianchi, G P Capitani, E De Sanctis, P Levi-Sandri, V Muccifora, E Polli, A R Reolon, P Rossi
INFN, GENOA – M Anghinolfi, P Corvisiero, G Gervino, L Mazzaschi, V Mokeev, G Ricco, M Ripani, M Sanzone, M Taiuti (√ Spokesperson), A Zucchiatti
GEORGE MASON U – B J Lieb
HAMPTON U – K Beard
JAMES MADISON U – K Giovanetti
KENT STATE U – D M Manley
PITTSBURGH U – S A Dytman
RENSSELAER POLY – G S Adams, N C Mukhopadhyay, J Napolitano, P Stoler (√ Spokesperson)
VIRGINIA U – D Crabb, D B Day, R Marshall, J S McCarthy, R C Minehart, D Počanić, O A Rondon-Aramayo, R Sealock, L C Smith, S T Thornton, H Weber
WILLIAM AND MARY COLL – C E Carlson, A Coleman, H O Funsten, T Y Tung

Accelerator CEBAF *Detector* CLAS

Reactions

$e^- p \to e^- p \pi^0$	6.0 GeV (T_{lab})
$e^- p \to e^- p \eta$	"
$e^- p \to e^- n \pi^+$	"

Particles studied $\Delta(1232\, P_{33})$, $N(1440\, P_{11})$, $N(1535\, S_{11})$, $N(1680\, F_{15})$

Brief description Studies the transition form-factors of prominent resonances, $\Delta(1232\, P_{33})$, $N(1440\, P_{11})$, $N(1535\, S_{11})$, and $N(1680\, F_{15})$ at high momentum transfers, in the transition region where constituent-quark models are expected to become less relevant and gluons and current-quarks are believed to play a more active role. Scheduled to run in Hall B in 1996/97.

Related experiments CEBAF-94-014

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CEBAF-91-008

(Proposed Sep 1991, Approved Jan 1992, In preparation)

PHOTOPRODUCTION OF η AND η' MESONS

CLAS COLLABORATION
ARIZONA STATE U – B G Ritchie (√ Spokesperson)
CATHOLIC U – H Crannell, J T O'Brien, D I Sober
CEBAF – B A Mecking
FLORIDA STATE U – L C Dennis
GEORGETOWN U – J Lambert
GEORGE WASHINGTON U – B L Berman, W J Briscoe, K Dhuga, W R Dodge
BOŠKOVIĆ INST, ZAGREB – I Šlaus
SOUTH CAROLINA U – C Djalali, B M Preedom, A Tam, S Whisnant
UCLA – B M K Nefkens

Accelerator CEBAF *Detector* CLAS

Reactions

$\gamma p \to \eta p$	0.65–2.25 GeV (E_{lab})
$\gamma p \to \eta' p$	"

Particles studied η, η'

Brief description Measures the differential cross-section for the photoproduction of η and η' mesons using the Hall-B bremsstrahlung photon tagger and the CLAS spectrometer. The target is a liquid hydrogen cell. Identification of the η and η' is made by detection of the recoil proton in the CLAS. Studies the properties of η, η', $N(1535\, S_{11})$, and $N(1710\, P_{11})$. Scheduled to run in Hall B.

Related experiments CEBAF-89-039, CEBAF-89-045, CEBAF-93-008, CEBAF-93-017

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CEBAF-91-011

(Proposed Oct 1991, Approved Dec 1993, In preparation)

HIGH PRECISION SEPARATION OF POLARIZED STRUCTURE FUNCTIONS IN ELECTROPRODUCTION OF THE Δ AND ROPER RESONANCES

CAL STATE, LA – M B Epstein
CEBAF – J P Chen, J J LeRose, J H Mitchell, S Nanda, A Saha
INFN, ROME – E Cisbani, R de Leo, F Ghio, M Jodice, G M Urciuoli
INFN, LECCE – R Perrino
MARYLAND U – J J Kelly, P Markowitz
MIT – W Bertozzi, D Dale, S Gilad, A Sarty
NIKHEF, AMSTERDAM – H P Blok
OLD DOMINION U – P E Ulmer, L B Weinstein
RUTGERS U – R Gilman, C Glashausser, G Kumbartzki, R Ransome, P M Rutt
SACLAY – J Y Mougey
NEW HAMPSHIRE U – J Calarco
ROME U, TORVERGATA – S Frullani (√ Spokesperson), F Garibaldi
VIRGINIA U – D H Barkhuff, R Lourie (√ Spokesperson), B Milbrath, S Van Verst
WILLIAM AND MARY COLL – J M Finn, M Jones, C F Perdrisat

Accelerator CEBAF *Detector* Spectrometer

Reactions Polarized beam

$e^- p \to e^- p \pi^0$	3.2 GeV/c

Particles studied $\Delta(1232\, P_{33})$

Brief description Studies the six structure functions in the N-Δ transition as a function of θ_{cm}. The measurement is performed at $Q^2 = 1.0$ (GeV/c)^2, at 6 c.m. angles, which allows a stand-alone multipole analysis of the amplitudes. Uses high-resolution spectrometers and a focal plane polarimeter. The target is liquid hydrogen. Scheduled to run in Hall A.

Related experiments CEBAF-89-037, -89-042, -93-036

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CEBAF-91-023

(Proposed Oct 1991, Approved May 1992, Jan 1995, In preparation)

MEASUREMENT OF POLARIZED STRUCTURE FUNCTIONS IN INELASTIC ELECTRON–PROTON SCATTERING USING THE CEBAF LARGE ACCEPTANCE SPECTROMETER

N* COLLABORATION

CEBAF – W Brooks, V D Burkert (✓ Spokesperson), A Freyberger, B A Mecking, M Mestayer, B B Niczyporuk, E Smith, A Yegneswaran
CHRISTOPHER NEWPORT U – D Doughty, L Elouadrhiri, D Heddle
DUKE U – M Spraeker, H R Weller
FLORIDA STATE U – L C Dennis, P Dragovitsch, K W Kemper
FRASCATI – N Bianchi, G P Capitani, E De Sanctis, P Levi-Sandri, V Muccifora, E Polli, A R Reolon, P Rossi
INFN, GENOA – M Anghinolfi, P Corvisiero, G Gervino, L Mazzaschi, V Mokeev, G Ricco, M Ripani, M Sanzone, M Taiuti, A Zucchiatti
HAMPTON U – K B Beard
JAMES MADISON U – K Giovanetti
KENT STATE U – D Keane, D M Manley
OLD DOMINION U – S Kuhn
PITTSBURGH U – S A Dytman
RENSSELAER POLY – G S Adams, N C Mukhopadhyay, P Stoler
VIRGINIA U – D G Crabb (✓ Spokesperson), D B Day, J S McCarthy, R C Minehart (✓ Spokesperson), O A Rondon-Aramayo, R Sealock, L C Smith, S T Thornton, H J Weber
VIRGINIA STATE U – C E Stronach
VIRGINIA TECH – R A Arndt, D A Jenkins, L D Roper
WILLIAM AND MARY COLL – A Coleman, H O Funsten, T Y Tung
YALE U – M Gai

Accelerator CEBAF *Detector* CLAS

Reactions Polarized beam and target

$e^- p \rightarrow e^- X$	1.2 – 4.0, 6.0 GeV (T_{lab})

Particles studied $N(1440\,P_{11})$

Brief description Measures the inclusive polarized structure functions, A_1 and A_2, in the range $0.2 \leq Q^2 \leq 2.5$ $(GeV/c)^2$ and $1.1 < W < 2.5$ GeV. Uses polarized NH_3 target. Scheduled to run in Hall B in 1998.

Related experiments CEBAF-93-009

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CEBAF-91-024

(Proposed Oct 1991, Approved Dec 1991, In preparation)

SEARCH FOR MISSING RESONANCES IN THE ELECTROPRODUCTION OF ω MESONS

N* COLLABORATION

CEBAF – W Brooks, V D Burkert (Spokesperson), D Joyce, B A Mecking (Spokesperson), M Mestayer, B B Niczyporuk, E Smith, A Yegneswaran
CHRISTOPHER NEWPORT U – D Doughty, D Heddle, Z J Li
FLORIDA STATE U – L C Dennis
FRASCATI – N Bianchi, G P Capitani, E De Sanctis, P Levi-Sandri, V Muccifora, E Polli, A R Reolon, P Rossi
INFN, GENOA – M Anghinolfi, P Corvisiero, G Gervino, L Mazzaschi, V Mokeev, G Ricco, M Ripani, M Sanzone, M Taiuti, A Zucchiatti
GEORGE MASON U – B J Lieb
HAMPTON U – K B Beard
JAMES MADISON U – K Giovanetti
KENT STATE U – D M Manley (Spokesperson)
PITTSBURGH U – S A Dytman
RENSSELAER POLY – G S Adams, N C Mukhopadhyay, P Stoler
VIRGINIA U – D G Crabb, D B Day, R Marshall, J S McCarthy, R C Minehart, D Počanić, O A Rondon-Aramayo, R Sealock, L C Smith, S T Thornton, H J Weber
VIRGINIA STATE U – C E Stronach
WILLIAM AND MARY COLL – C E Carlson, H O Funsten (Spokesperson), T Y Tung
YALE U – M Gai

Accelerator CEBAF *Detector* CLAS

Reactions

$e^- p \rightarrow e^- p \pi^+ \pi^- X$	1.6, 2.4, 4.0 GeV (T_{lab})

Brief description The experiment is aimed at searching for 'missing' 3-quark baryon states in the mass range from 1.7 to 2.2 GeV/c^2 in the $p\omega$ decay channel. Scheduled to run in Hall B in 1996/97.

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CEBAF-93-006

(Proposed Apr 1993, Approved Jun 1993, In preparation)

TWO PION DECAY OF ELECTROPRODUCED LIGHT QUARK BARYON RESONANCES

N* COLLABORATION

CEBAF – W Brooks, V D Burkert (✓ Spokesperson), B A Mecking, B B Niczyporuk, E Smith, A Yegneswaran
CHRISTOPHER NEWPORT U – D Doughty, D Heddle
DUKE U – R Chasteler, H R Weller
FLORIDA STATE U – L C Dennis, P Dragovitsch
FRASCATI – N Bianchi, G P Capitani, E De Sanctis, P Levi-Sandri, V Muccifora, E Polli, A R Reolon, P Rossi
INFN, GENOA – M Anghinolfi, P Corvisiero, V Mokeev, G Ricco, M Ripani (✓ Spokesperson), M Sanzone, M Taiuti, A Zucchiatti
GEORGE MASON U – B J Lieb
HAMPTON U – K B Beard
JAMES MADISON U – K Giovanetti
KENT STATE U – D M Manley
NORTH CAROLINA STATE U – D R Tilley
PITTSBURGH U – S A Dytman
RENSSELAER POLY – G S Adams, N C Mukhopadhyay, J Napolitano, P Stoler
VIRGINIA U – D G Crabb, D B Day, R Marshall, J S McCarthy, R C Minehart, D Počanić, O A Rondon-Aramayo, R Sealock, L C Smith, S T Thornton, H J Weber
WILLIAM AND MARY COLL – C E Carlson, A Coleman, H O Funsten, T Y Tung
YALE U – M Gai

Accelerator CEBAF *Detector* CLAS

Reactions

$e^- p \rightarrow e^-$ nucleon pion pion X	1.6, 2.4, 4.0 GeV (T_{lab})
$e^- n \rightarrow e^-$ nucleon pion pion X	"

Brief description Studies some aspects of baryon spectra in the nonstrange sector, *e.g.*, the form-factors of some poorly known states. It also looks for highly excited nucleon states around 1.6 GeV (mostly $[56, 0+]$ and $[70, 1-]$ multiplets) and the 'missing' states around 2 GeV (mostly $[56, 2+]$ and $[70, 2+]$ multiplets) predicted by quark models. Such states would strongly decay through $\Delta\pi$, and ρN channels, both giving a final state with two pions. Approved for 800 hours with hydrogen target and 400 hours with deuterium target. Expected to run in Hall B in 1996/97.

Related experiments CEBAF-91-024, CEBAF-91-002, CEBAF-93-033

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WWW Home-page http://aiacehp.ge.infn.it/twopion.html

CEBAF-93-030

(Proposed Apr 1993, Approved Jun 1993, In preparation)

MEASUREMENT OF THE STRUCTURE FUNCTIONS FOR KAON ELECTROPRODUCTION

CLAS COLLABORATION
CEBAF – M Mestayer (√ Spokesperson), E Smith
CARNEGIE MELLON U – R Magahiz, R A Schumacher
CHRISTOPHER NEWPORT U – D Doughty
FLORIDA STATE U – S Capstick
GEORGE WASHINGTON U – C Bennhold
OHIO U – T Adami, R W Finlay, S Grimes, K H Hicks (√ Spokesperson), A Kumar, D S Onley, J Rapaport, L E Wright
PITTSBURGH U – S A Dytman
RICHMOND U – P D Rubin
SOUTH CAROLINA U – A Tam
WILLIAM AND MARY COLL – H O Funsten

Accelerator CEBAF *Detector* CLAS

Reactions

$e^- p \to e^- K^+ \Lambda$	2.4, 3.2, 4.0 GeV (T_{lab})
$e^- p \to e^- K^+ \Sigma^0$	"

Particles studied N^*(unspec)

Brief description Measures L, T, LT, and TT structure functions for Q^2 between 1 and 2 $(GeV/c)^2$ and W between 1.8 and 2.2 GeV. Measures isospin dependence by comparing Λ and Σ productions. Studies production ratio of hyperons up to the $\Lambda(1520)$. Measures polarization of Λ. Searches for N^* resonances which decay to hyperon–K^+ final states. Scheduled to run in Hall B.

Journal papers NIM A323 (1992) 191, and IEEE TNS 39 (1992) 690.

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CEBAF-93-033

(Proposed Apr 1993, Approved Jun 1993, In preparation)

A SEARCH FOR MISSING BARYONS FORMED IN $\gamma p \to p\pi^+\pi^-$ USING THE CLAS DETECTOR

CLAS COLLABORATION
RENSSELAER POLY – G S Adams, J Napolitano (√ Spokesperson), P Stoler, M Witkowski, B B Wojtsekhowski
CARNEGIE MELLON U – R Schumacher
RICE U – G Mutchler
KENT STATE U – D M Manley

Accelerator CEBAF *Detector* CLAS

Reactions

$\gamma p \to p \pi^+ \pi^-$	0.5–2.3 GeV (E_{lab})

Particles studied N^*(unspec)

Brief description Uses tagged photons and liquid hydrogen target. Scheduled to run in Hall B in 1996/97.

Related experiments CEBAF-89-004, CEBAF-89-024

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WWW Home-page http://www.cebaf.gov/clas/CLAS.html

CEBAF-93-036

(Proposed Apr 1993, Approved Jun 1993, In preparation)

MEASUREMENT OF SINGLE PION ELECTROPRODUCTION FROM THE PROTON WITH POLARIZED BEAM AND POLARIZED TARGET USING CLAS

N* COLLABORATION
CEBAF – W Brooks, V D Burkert, D Joyce, B A Mecking, B B Niczyporuk, E S Smith, A Yegneswaran
CHRISTOPHER NEWPORT U – D Doughty, D Heddle, Z J Li
DUKE U – R Chasteler (√ Spokesperson), H R Weller (√ Spokesperson)
FLORIDA STATE U – L C Dennis, P Dragovitsch
FRASCATI – N Bianchi, G P Capitani, E De Sanctis, P Levi-Sandri, V Muccifora, E Polli, A R Reolon, P Rossi
INFN, GENOA – M Anghinolfi, P Corvisiero, G Gervino, L Mazzaschi, V Mokeev, G Ricco, M Ripani, M Sanzone, M Taiuti, A Zucchiatti
GEORGE MASON U – B J Lieb
HAMPTON U – K B Beard
JAMES MADISON U – K Giovanetti
KENT STATE U – D M Manley
PITTSBURGH U – S A Dytman
RENSSELAER POLY – G S Adams, N C Mukhopadhyay, P Stoler
VIRGINIA U – D G Crabb, D B Day, J S McCarthy, R C Minehart (√ Spokesperson), D Počanić, O A Rondon-Aramayo, R Sealock, L C Smith, S T Thornton, H J Weber
VIRGINIA STATE U – C E Stronach
WILLIAM AND MARY COLL – C E Carlson, H O Funsten
YALE U – M Gai

Accelerator CEBAF *Detector* CLAS

Reactions Polarized beam and target

$e^- p \to e^- \pi^+ n$	1.2–4.0 GeV (T_{lab})
$e^- p \to e^- p \pi^0$	"

Particles studied $N(1440\,P_{11})$, $N(1520\,D_{13})$, $\Delta(1232\,P_{33})$

Brief description Measures polarization asymmetries for exclusive single-pion channels. Provides information on the Roper resonance. Scheduled to run in Hall B in 1998/99.

Related experiments CEBAF-89-037, CEBAF-89-038, CEBAF-89-040, CEBAF-89-042, CEBAF-89-043, CEBAF-91-002

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CEBAF-94-008

(Proposed Apr 1994, Approved Jun 1994, In preparation)

PHOTOPRODUCTION OF η and η' MESONS FROM DEUTERIUM

CLAS COLLABORATION
ARIZONA STATE U – B Ritchie (√ Spokesperson)
CEBAF – B A Mecking
GEORGETOWN U – J Lambert
RICHMOND U – G P Gilfoyle, R W Major, M F Vineyard
SOUTH CAROLINA U – C Djalali, B Preedom, S Whisnant

Accelerator CEBAF *Detector* CLAS

Reactions

γ deut $\to \eta$ deut	0.63–1.52 GeV (E_{lab})
γ deut $\to \eta'$ deut	"

Particles studied η, η', $N(1535\,S_{11})$, $N(1710\,P_{11})$

Brief description Measures the differential cross-section for the coherent and incoherent photoproduction of η and η' mesons on the deuteron for photon energies from 0.63 to 1.52 GeV. Uses a liquid deuterium target cell and a tagged photon beam. Provides information on the properties of η, η' and gives insight into the structure of related nucleon resonances. Studies the behavior of the mesons in the lightly bound two-nucleon systems. Scheduled to run in Hall B, for 23 days (simultaneously with CEBAF-89-045, and CEBAF-93-017).

Related experiments CEBAF-89-039, CEBAF-89-045, CEBAF-93-008, CEBAF-93-017, CEBAF-91-008

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CEBAF-94-016

(Proposed Apr 1994, Approved Jan 1995, In preparation)

MEASUREMENT OF RARE RADIATIVE DECAYS OF THE ϕ MESON

CATHOLIC U – H Crannell, J O'Brien, D I Sober
CEBAF – V D Burkert, B Niczyporuk, E S Smith
INDIANA U – B Brabson, R Crittenden, A Dzierba (√ Spokesperson), J Gunter, R Lindenbusch, D Rust, P Smith, S Teige
MOSCOW, ITEP – M V Kossov
NOTRE DAME U – J J Kolata, J Losecco, A H Sanjari, W D Shephard
RICE U – S Ahmad, B E Bonner, G Mutchler
RICHMOND U – G P Gilfoyle, P Rubin, M F Vineyard
RENSSELAER POLY – G S Adams, J J Napolitano (√ Co-spokesperson), M T Witkowski
VIRGINIA U – E Frlež, D Počanić
WILLIAM AND MARY COLL – D Armstrong

Accelerator CEBAF *Detector* Calorimeter

Reactions

$\gamma\, p \rightarrow \eta\, p$	4 GeV (E_{lab})

Particles studied ϕ, ρ, ω

Brief description Uses the 4 GeV tagged photon beam and a lead glass detector to study decays of the ϕ into all-photon final states. Expects to achieve the branching ratio sensitivity of about 10^{-5}, which should be enough to observe the (yet unobserved) decays $\phi \rightarrow f_0(980)\gamma$, $\phi \rightarrow a_0(980)\gamma$, and $\phi \rightarrow \eta'\gamma$, and to improve the measurement of other branching ratios of ϕ, ρ and ω. Scheduled to run in Hall B, for 30 days.

Related experiments BNL-852

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WWW Home-page
http://www.cebaf.gov/physics/radphi/radphi.html

CEBAF-94-109

(Proposed Dec 1994, Approved Jan 1995, In preparation)

PHOTOPRODUCTION OF THE ρ MESON FROM THE PROTON WITH LINEARLY POLARIZED PHOTONS

ARIZONA STATE U – R Alarcon, J Comfort
CATHOLIC U – H Crannell, S Matthews, J O'Brien, D I Sober
CEBAF – R R Whitney (√ Spokesperson)
GEORGE WASHINGTON U – B L Berman, W J Briscoe, P L Cole (√ Spokesperson), J P Connelly (√ Spokesperson), K S Dhuga, L Murphy, S Rugari
KENT STATE U – D M Manley
OLD DOMINION U – C Hyde-Wright, W Roberts
RENSSELAER POLY – J J Napolitano
SACLAY – G Audit, M Guidal, F Kunne-Perrot, J M Laget, C Marchand, B Saghai
FLORIDA STATE U, SCRI – S C Capstick
VIRGINIA TECH – J Ficenec, D A Jenkins

Accelerator CEBAF *Detector* CLAS

Reactions Polarized beam

$\gamma\, p \rightarrow \rho^0\, p$	1.0–1.5 GeV (E_{lab})
$\gamma\, p \rightarrow \rho^+\, n$	"
$\gamma\, p \rightarrow \rho^0\, p$	1.4–2.1 GeV (E_{lab})
$\gamma\, p \rightarrow \rho^+\, n$	"

Particles studied N^*(unspec), Δ(unspec)

Brief description Studies the baryon resonance region between 1.66 and 2.22 GeV center-of-mass energy in the ρN channel. Uses a linearly polarized tagged photon beam produced by coherent bremsstrahlung from a diamond crystal. Measures the beam asymmetry and extracts the spin density matrix elements from the angular distribution of the two-pion decay of the ρ meson as a function of s and t. This facilitates the search for baryon resonance contributions and provides information on diffractive, t- and u-channel processes. Scheduled to run in Hall B, for 11 days at 4 GeV, and 9 days at 6 GeV.

Related experiments CEBAF-93-033

E-mail contact cole@micro1.cebaf.gov

Other CEBAF Experiments

Listed here are *some other* Jefferson Lab's (formerly CEBAF) experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. The regularly published Program Advisory Committee (PAC) reports often list all the approved experiments at the Lab. For the copies of these reports contact *users@cebaf.gov* , or check the Lab's main Web page (http://www.cebaf.gov).

CEBAF-89-004 (In preparation)

ELECTROMAGNETIC PRODUCTION OF HYPERONS

By CLAS Collaboration

Spokesperson: Reinhard A. Schumacher [Carnegie Mellon U.]

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CEBAF-89-008 (In preparation)

INCLUSIVE SCATTERING FOR NUCLEI AT $x > 1$ AND HIGH Q^2

Spokespersons: Bradley W. Filippone [Cal Tech], Donal B. Day [Virginia U.]

E-mail contact brad@erin.caltech.edu, dbd@virginia.edu

CEBAF-89-009 (In preparation)

INVESTIGATION OF THE SPIN DEPENDENCE OF THE ΛN EFFECTIVE INTERACTION IN THE P SHELL

Spokespersons: Robert E. Chrien [Brookhaven], Ed Hungerford [Houston U.]

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CEBAF-89-012 (Taking data)

TWO-BODY PHOTODISINTEGRATION OF THE DEUTERON AT FORWARD ANGLES AND PHOTON ENERGIES BETWEEN 1.5 AND 4.0 GeV

Spokesperson: Roy J. Holt [Argonne]

E-mail contact holt@anlphy.phy.anl.gov

CEBAF-89-015 (In preparation)

STUDY OF COINCIDENCE REACTIONS IN THE DIP AND Δ-RESONANCE REGIONS

Spokesperson: Hossain Baghaei [Virginia U.]

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CEBAF-89-017 (In preparation)

ELECTROEXCITATION OF THE $\Delta(1232)$ IN NUCLEI

Spokesperson: Richard Sealock [Virginia U.]

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CEBAF-89-033 (In preparation)

MEASUREMENT OF RECOIL POLARIZATION IN THE $^{16}O(\vec{e}, e'\vec{p})$ REACTION WITH 4 GeV ELECTRONS

Spokespersons: Sirish Nanda, J.Wallace Van Orden [CEBAF], Chia Cheh (George) Chang [Maryland U.], Charles Glashausser [Rutgers U.]

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SUMMARIES OF CEBAF EXPERIMENTS

CEBAF-89-037 (In preparation)

ELECTROPRODUCTION OF THE $\Delta(1232\,P_{33})$ RESONANCE
By N* Collaboration

Spokespersons: Volker D. Burkert [CEBAF], Ralph C. Minehart [Virginia U.]

E-mail contact burkert@cebaf.gov, minehart@virginia.edu

CEBAF-89-042 (In preparation)

MEASUREMENT OF THE ELECTRON ASYMMETRY IN THE $p(e,e'p)\pi^0$ AND $p(e,e'\pi^+)n$ IN THE MASS REGION OF THE $\Delta(1232\,P33)$ FOR $Q^2 \leq 2$ (GeV/c)^2
By N* Collaboration

Spokespersons: Volker D. Burkert [CEBAF], Ralph C. Minehart [Virginia U.]

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CEBAF-89-045 (In preparation)

STUDY OF KAON PHOTOPRODUCTION ON DEUTERIUM

Spokesperson: Bernhard A. Mecking [CEBAF]

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CEBAF-91-003 (In preparation)

A STUDY OF LONGITUDINAL CHARGED PION ELECTROPRODUCTION IN ^{2}D, ^{3}He, AND ^{4}He

Spokesperson: Harold E. Jackson [Argonne]

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CEBAF-91-004 (In preparation)

MEASUREMENT OF STRANGE QUARK EFFECTS USING PARITY VIOLATING ELASTIC SCATTERING FROM ^{4}He AT $Q^2 = 0.6$(GeV/c)^2

Spokesperson: Betsy Beise [Maryland U.]

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CEBAF-91-007 (In preparation)

MEASUREMENT OF THE NUCLEAR DEPENDENCE AND MOMENTUM TRANSFER DEPENDENCE OF QUASIELASTIC $(e,e'p)$ SCATTERING AT LARGE MOMENTUM TRANSFER

Spokesperson: Richard G. Milner [MIT]

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CEBAF-91-010 (In preparation)

PARITY VIOLATION IN ELASTIC SCATTERING FROM THE PROTON AND ^{4}He

Spokespersons: Paul A. Souder [Syracuse U.], J.M. Finn [William and Mary Coll.]

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WWW Home-page http://www.cebaf.gov/halla/parity.html

CEBAF-91-014 (In preparation)

QUASIFREE STRANGENESS PRODUCTION IN NUCLEI

Spokesperson: Charles E. Hyde-Wright [Old Dominion U.]

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CEBAF-91-015 (In preparation)

HELICITY STRUCTURE OF PION PHOTOPRODUCTION
By CLAS Collaboration

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CEBAF-91-016 (In preparation)

ELECTROPRODUCTION OF KAONS AND LIGHT HYPERNUCLEI

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CEBAF-91-017 (In preparation)

MEASUREMENT OF G^0, THE FLAVOR SINGLET CHARGE FORM-FACTOR OF PROTON

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CEBAF-91-026 (In preparation)

MEASUREMENT OF THE ELECTRIC AND MAGNETIC STRUCTURE FUNCTIONS OF DEUTERON AT LARGE MOMENTUM TRANSFERS

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CEBAF-93-008 (In preparation)

INCLUSIVE η PHOTOPRODUCTION IN NUCLEI

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CEBAF-93-009 (In preparation)

THE POLARIZED STRUCTURE FUNCTION G_{1n} AND THE Q^2 DEPENDENCE OF THE GERASIMOV-DRELL-HEARN SUM RULE FOR THE NEUTRON
By N* Collaboration

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CEBAF-93-012 (In preparation)

ELECTROPRODUCTION OF LIGHT QUARK MESONS
By CLAS Collaboration

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CEBAF-93-017 (In preparation)

STUDY OF $\gamma d \to pn$ AND $\gamma d \to p\Delta^0$ REACTIONS FOR SMALL MOMENTUM TRANSFERS

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CEBAF-93-021 (In preparation)

THE CHARGED PION FORM-FACTOR

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SUMMARIES OF CEBAF EXPERIMENTS

CEBAF-93-022 (In preparation)

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CEBAF-93-024 (In preparation)

MEASUREMENT OF THE MAGNETIC FORM-FACTOR OF THE NEUTRON AT LARGE MOMENTUM TRANSFERS

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CEBAF-93-026 (In preparation)

THE CHARGE FORM-FACTOR OF THE NEUTRON

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CEBAF-93-027 (In preparation)

ELECTRIC FORM-FACTOR OF PROTON BY RECOIL POLARIZATION

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CEBAF-93-031 (In preparation)

PHOTOPRODUCTION OF VECTOR MESONS AT HIGH t

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CEBAF-93-038 (In preparation)

THE ELECTRIC AND MAGNETIC FORM-FACTORS OF THE NEUTRON FROM THE $d(\vec{e}, e'\vec{n})p$ REACTION

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CEBAF-94-002 (In preparation)

PHOTOPRODUCTION OF VECTOR MESONS OFF NUCLEI

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CEBAF-94-005 (In preparation)

DETERMINATION OF THE $N\Delta$ AXIAL VECTOR TRANSITION FORM-FACTOR $G^A{}_{N\Delta}$ FROM THE $ep \to e'\Delta^{++}\pi^-$ REACTION

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CEBAF-94-010 (In preparation)

MEASUREMENT OF THE NEUTRON (^{3}He) SPIN STRUCTURE FUNCTION AT LOW Q^2: A CONNECTION BETWEEN THE BJORKEN AND DRELL-HEARN-GERASIMOV SUM RULES

Spokespersons: Gordon D. Cates [Princeton U.], Zein-Eddine Meziani [Temple U.]

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CEBAF-94-012 (In preparation)

MEASUREMENT OF PHOTOPROTON POLARIZATION IN THE H$(\gamma, \vec{p})\pi^0$ REACTION

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CEBAF-94-014 (In preparation)

The $\Delta(1232)$ FORM-FACTOR AT HIGH MOMENTUM TRANSFER

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CEBAF-94-015 (In preparation)

STUDY OF THE AXIAL ANOMALY USING THE $\gamma\pi^+ \to \pi^+\pi^0$ REACTION NEAR THRESHOLD

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CEBAF-94-017 (In preparation)

THE NEUTRON MAGNETIC FORM-FACTOR FROM PRECISION MEASUREMENTS OF THE RATIO OF QUASIELASTIC ELECTRON–NEUTRON TO ELECTRON–PROTON SCATTERING IN DEUTERIUM

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CEBAF-94-103 (In preparation)

THE PHOTOPRODUCTION OF PIONS

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CEBAF-94-104 (In preparation)

THE FUNDAMENTAL $\gamma n \to \pi^- p$ PROCESS IN ^{2}H, ^{4}He, and ^{12}C IN THE 1.2–6.0 GeV REGION

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CEBAF-95-003 (In preparation)

MEASUREMENT OF K^0 ELECTROPRODUCTION

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Selected CERN Experiments

CERN-IS-300

(Proposed Sep 1991, Approved Sep 1991, In preparation)

A SEARCH FOR AXIONS AND MASSIVE NEUTRINOS

IS300-ISOLDE COLLABORATION

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CERN – A De Rujula, H L Ravn
CHALMERS UNIV TECH – B Jonson, G Nyman

Accelerator CERN-PS *Detector* Spectrometer

Particles studied axion, ν

Brief description A search for axions and a heavy neutrino relying on a strong, high purity source of radioactive ^{125}I. A possible 17 keV neutrino emission in the electron capture decay of ^{125}I could be observed by studying the internal bremsstrahlung spectrum. A possible observation of axions in the 35.5 keV M1 transition of the ^{125}Te daughter is based on an analogue of the Mössbauer effect, i.e. the axion resonance absorption in the ^{125}Te resonance absorber. Awaiting for a staggered beam from the PS Booster, expected to be available in Spring 97.

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CERN-LEP-ALEPH

(Proposed 1982, Approved Nov 1982, Began data-taking Aug 1989, In progress)

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Accelerator CERN-LEP *Detector* ALEPH

Reactions

$e^+ e^-$	< 200 GeV (E_{cm})

Particles studied W^+, W^-, Z^0, hvy-flavor, hvy-lepton, higgs, s-particle

Brief description A 4π detector designed to give as much detailed information as possible about complex events in high-energy e^+e^- collisions. A superconducting coil 5 m in diameter and 6 m long produces a uniform 1.5 tesla field in the beam direction. Inside the coil, in order of increasing radius, there

is a microstrip solid state device, an Inner Tracking Chamber (ITC) using drift wires, a Time Projection Chamber (TPC), 3.6 m diameter, 4.4 m long, and an electromagnetic calorimeter, of 2 mm lead sheets with proportional wire sampling. Outside of the coil, a 1.2 m thick Fe return path is used as a hadron calorimeter, and a double layer of drift tubes aids in the muon identification. Strong points of the detector are a precision of momentum measurements for charged particles, due to a high magnetic field and a TPC, a good identification of electrons and muons even when they are immersed in jets, and a spatial resolution obtained in $e\gamma$ calorimetry. A minivertex detector provides a capability for identifying secondary vertices, and a silicon–tungsten calorimeter installed in 1992 allows a significant reduction of the luminosity error. Taking data (July 96).

Journal papers NIM 217 (1983) 305, NIM 217 (1983) 317, NIM A225 (1984) 481, NIM A226 (1984) 82, IEEE TNS 32 (1985) 605, NIM A228 (1985) 327, NIM A234 (1985) 47, NIM A235 (1985) 296, NIM A239 (1985) 192, NIM A244 (1986) 516, NIM A247 (1986) 438, NIM A251 (1986) 449, NIM A252 (1986) 392, NIM A252 (1986) 399, NIM A252 (1986) 403, IEEE TNS 34 (1987) 133, CPC 45 (1987) 229, CPC 45 (1987) 283, CPC 45 (1987) 433, NIM A257 (1987) 587, IEEE TNS 35 (1988) 316, NIM A263 (1988) 43, NIM A263 (1988) 58, NIM A268 (1988) 144, NIM A271 (1988) 449, CPC 57 (1989) 401, IEEE TNS 36 (1989) 1459, IEEE TNS 36 (1989) 1464, IEEE TNS 36 (1989) 1514, NIM A277 (1989) 358, NIM A279 (1989) 212, NIM A283 (1989) 573, PL B231 (1989) 519, IJMP C1 (1990) 147, IEEE TNS 37 (1990) 1210, NIM A286 (1990) 61, NIM A289 (1990) 176, NIM A294 (1990) 121 [erratum: NIM A303 (1991) 393], NIM A297 (1990) 153, NIM A297 (1990) 390, HEPNP 14 (1990) 966, PL B234 (1990) 209, PL B234 (1990) 399, PL B235 (1990) 399, PL B236 (1990) 86, PL B236 (1990) 233, PL B236 (1990) 501, PL B236 (1990) 511, PL B237 (1990) 291, PL B241 (1990) 141, PL B241 (1990) 623, PL B241 (1990) 635, PL B244 (1990) 541, PL B244 (1990) 551, PL B245 (1990) 289, PL B246 (1990) 306, PL B250 (1990) 172, ZPHY C48 (1990) 365, NIM A306 (1991) 446, NP (PROC SUPPL) 23B (1991) 291, PL B255 (1991) 623, PL B257 (1991) 479, PL B257 (1991) 492, PL B258 (1991) 236, PL B259 (1991) 377, PL B262 (1991) 139, PL B263 (1991) 112, PL B263 (1991) 325, PL B264 (1991) 476, PL B265 (1991) 430, PL B265 (1991) 475, PL B266 (1991) 218, PL B273 (1991) 181, NIM A315 (1992) 121, NIM A320 (1992) 177, NIM A323 (1992) 213, PL B276 (1992) 247, PL B278 (1992) 209, PL B279 (1992) 411, PL B284 (1992) 151, PL B284 (1992) 163, PL B284 (1992) 177, PL B285 (1992) 309, PL B292 (1992) 210, PL B294 (1992) 145, PL B295 (1992) 174, PL B295 (1992) 396, PL B297 (1992) 432, PL B297 (1992) 449, PL B297 (1992) 459, PRPL 216 (1992) 253, ZPHY C53 (1992) 1, ZPHY C53 (1992) 21, ZPHY C53 (1992) 375, ZPHY C54 (1992) 75, ZPHY C54 (1992) 211, ZPHY C55 (1992) 209, PL B298 (1993) 479, PL B303 (1993) 198, PL B307 (1993) 187, PL B307 (1993) 194, PL B307 (1993) 209, PL B308 (1993) 425, PL B311 (1993) 425 [erratum: PL B316 (1993) 631], PL B313 (1993) 299, PL B313 (1993) 312, PL B313 (1993) 498, PL B313 (1993) 509, PL B313 (1993) 520, PL B313 (1993) 535, PL B313 (1993) 549, PL B314 (1993) 459, ZPHY C57 (1993) 17, ZPHY C59 (1993) 215, ZPHY C59 (1993) 369, ZPHY C60 (1993) 71, IEEE TNS 41 (1994) 236, NIM A346 (1994) 461, PL B321 (1994) 168, PL B322 (1994) 275, PL B322 (1994) 441, PL B332 (1994) 209, PL B332 (1994) 219, PL B334 (1994) 244, PL B335 (1994) 99, ZPHY C62 (1994) 1, ZPHY C62 (1994) 179, ZPHY C62 (1994) 539, ZPHY C64 (1994) 361, NIM A360 (1995) 481, NP (PROC SUPPL) 39BC (1995) 322, PL B343 (1995) 444, PL B345 (1995) 103, PL B346 (1995) 371, PL B346 (1995) 379, PL B346 (1995) 389, PL B349 (1995) 238, PL B349 (1995) 585, PL B352 (1995) 479, PL B355 (1995) 381, PL B355 (1995) 595, PL B356 (1995) 409, PL B357 (1995) 487 [erratum: PL B364 (1995) 247], PL B357 (1995) 685, PL B357 (1995) 699, PL B359 (1995) 236, PL B361 (1995) 221, ZPHY C66 (1995) 3, ZPHY C66 (1995) 355, ZPHY C69 (1995) 15, PL B365 (1996) 437, PL B369 (1996) 151, PL B373 (1996) 246, PL B374 (1996) 319, ZPHY C69 (1996) 183, ZPHY C69 (1996) 365, ZPHY C69 (1996) 379, ZPHY C69 (1996) 393, and ZPHY C69 (1996) 585.

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CERN-LEP-DELPHI

(Proposed 1982, Approved Nov 1982, Began data-taking Aug 1989, In progress)

THE DELPHI DETECTOR (*DE*TECTOR WITH *L*EPTON *P*HOTON AND *H*ADRON *I*DENTIFICATION)

DELPHI COLLABORATION

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Accelerator CERN-LEP *Detector* DELPHI

Reactions

$e^+ e^-$ < 200 GeV (E_{cm})

Particles studied W^+, W^-, Z^0, hvy-lepton, higgs, hvy-flavor

Brief description A general purpose LEP detector for physics on and above the Z^0, offering 3-dimensional information on curvature and energy deposition with fine spatial granularity, as well as identification of leptons and hadrons over most of the solid angle. A superconducting coil provides a 1.2 T solenoidal field of high uniformity. Tracking relies on a microvertex detector, an inner detector, a Time Projection Chamber (TPC), an outer detector, and forward drift chambers. A 3-layer silicon microvertex detector allows a precision measurement of the interaction vertex and decay vertices of short-lived particles such as bottom and charm hadrons and τ leptons. Electromagnetic showers are measured in the barrel with high granularity by the High Density Projection Chamber (HPC) and in the endcaps by $1^\circ \times 1^\circ$ projective towers composed of lead glass as an active material and phototriode readout. Hadron identification is provided mainly by liquid and gas ring imaging Čerenkov counters (RICH). A segmented magnet yoke serves for hadron calorimetry and as a filter for muons which are identified in two drift chamber layers. In addition, scintillator systems are implemented in the barrel and forward regions. A small angle Shashlik-type calorimeter (STIC) is used for the luminosity determination. Taking data (July 96).

Journal papers NIM 225 (1984) 477, NIM A225 (1984) 606, NIM A235 (1985) 310, NIM A241 (1985) 429, NIM A243 (1986) 77, NIM A243 (1986) 91, NIM A248 (1986) 317, NIM A252 (1986) 188, NIM A252 (1986) 413, NIM A252 (1986) 418, NIM A252 (1986) 435, NIM A252 (1986) 524, NIM A252 (1986) 573, NIM A254 (1987) 111, NIM A256 (1987) 65, NIM A256 (1987) 267, NIM A257 (1987) 499, NIM A260 (1987) 124, IEEE TNS 34 (1987) 227, NIM A263 (1988) 215, NIM A265 (1988) 218, NIM A269 (1988) 652, NIM A270 (1988) 393, NIM A273 (1988) 553, NIM A273 (1988) 565, NIM A273 (1988) 841, NIM A273 (1988) 847, IEEE TNS 36 (1989) 390, NIM A275 (1989) 49, NIM A277 (1989) 154, NIM A277 (1989) 160, NIM A277 (1989) 338, NIM A277 (1989) 347, NIM A279 (1989) 473, NIM A279 (1989) 518, NIM A283 (1989) 502, NIM A283 (1989) 567, NIM A283 (1989) 792, PL B231 (1989) 539, NIM A289 (1990) 400, NIM A290 (1990) 320, NIM A290 (1990) 327, NIM A292 (1990) 75, NIM A292 (1990) 319, NIM A292 (1990) 551, NIM A294 (1990) 424, PL B240 (1990) 271, PL B241 (1990) 425, PL B241 (1990) 435, PL B241 (1990) 449, PL B242 (1990) 536, PL B245 (1990) 276, PL B247 (1990) 137, PL B247 (1990) 148, PL B247 (1990) 157, PL B247 (1990) 167, PL B252 (1990) 140, PL B252 (1990) 149, NP B342 (1990) 1, IEEE TNS 38 (1991) 861, NIM A303 (1991) 233, NIM A305 (1991) 344, NIM A310 (1991) 596, PL B255 (1991) 466, PL B260 (1991) 240, PL B267 (1991) 422, PL B268 (1991) 296, NP B367 (1991) 511, ZPHY C50 (1991) 185, ZPHY C51 (1991) 25, ZPHY C52 (1991) 271, IEEE TNS 39 (1992) 166, NIM A315 (1992) 143, NIM A315 (1992) 393, NIM A323 (1992) 209, NIM A323 (1992) 351, NIM A323 (1992) 363, PL B274 (1992) 230, PL B274 (1992) 498, PL B275 (1992) 222, PL B275 (1992) 231, PL B276 (1992) 247, PL B276 (1992) 254, PL B276 (1992) 536, PL B277 (1992) 371, PL B281 (1992) 383, PL B286 (1992) 201, PL B289 (1992) 199, PL B295 (1992) 383, PL B298 (1992) 236, PL B298 (1992) 247, NP B373 (1992) 3, NP B386 (1992) 471, ZPHY C53 (1992) 41, ZPHY C53 (1992) 555, ZPHY C53 (1992) 567, ZPHY C54 (1992) 55, ZPHY C55 (1992) 555, ZPHY C56 (1992) 47, ZPHY C56 (1992) 63, NIM A328 (1993) 447, NIM A338 (1993) 284, PL B301 (1993) 145, PL B302 (1993) 356, PL B307 (1993) 187, PL B307 (1993) 221, PL B311 (1993) 379, PL B311 (1993) 408, PL B312 (1993) 253, PL B316 (1993) 620, PL B318 (1993) 249, NP B403 (1993) 3, ZPHY C57 (1993) 181, ZPHY C59 (1993) 21, ZPHY C59 (1993) 357, ZPHY C59 (1993) 533 [erratum: ZPHY C65 (1995) 709], PL B322 (1994) 459, PL B323 (1994) 242, PL B324 (1994) 500, PL B327 (1994) 386, PL B332 (1994) 488, PL B334 (1994) 435, PL B338 (1994) 409, PL B341 (1994) 109, NP B417 (1994) 3

[erratum: NP B426 (1994) 244], NP B418 (1994) 403, NP B421 (1994) 3, ZPHY C61 (1994) 407, ZPHY C62 (1994) 357, ZPHY C63 (1994) 3, ZPHY C63 (1994) 17, ZPHY C64 (1994) 183, NIM A362 (1995) 361, PL B342 (1995) 402, PL B345 (1995) 598, PL B347 (1995) 447, PL B355 (1995) 415, PL B357 (1995) 255, PL B357 (1995) 715, PL B359 (1995) 411, PL B361 (1995) 207, NP B444 (1995) 3, ZPHY C65 (1995) 555, ZPHY C65 (1995) 569, ZPHY C65 (1995) 587, ZPHY C65 (1995) 603, ZPHY C66 (1995) 323, ZPHY C66 (1995) 341, ZPHY C67 (1995) 1, ZPHY C67 (1995) 69, ZPHY C67 (1995) 183, ZPHY C67 (1995) 543, ZPHY C68 (1995) 13, ZPHY C68 (1995) 353, ZPHY C68 (1995) 363, ZPHY C68 (1995) 375, ZPHY C68 (1995) 541, ZPHY C69 (1995) 1, NIM A368 (1996) 314, PL B365 (1996) 448, PL B372 (1996) 172, ZPHY C69 (1996) 223, ZPHY C69 (1996) 561, ZPHY C69 (1996) 575, ZPHY C70 (1996) 179, and ZPHY C70 (1996) 371.

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CERN-LEP-L3

(Proposed 1982, Approved Nov 1982, Began data-taking Aug 1989, In progress)

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Accelerator CERN-LEP *Detector* L3

Reactions

$e^+ e^-$ < 200 GeV (E_{cm})

Particles studied Z^0, $W^{\pm}$, γ, quark, gluon, leptons, hvy-lepton, higgs, s-particle

Brief description The detector consists of a high-volume low-field solenoid magnet, a small central tracking chamber with very high spatial resolution, a high-resolution electromagnetic calorimeter encapsulating the central detector, a hadron calorimeter acting also as a muon filter, and high-precision muon tracking chambers. The detector is designed to measure energy and position of leptons with the highest obtainable precision allowing a mass resolution $\Delta m/m$ smaller than 2% in dilepton final states. Hadronic energy flux is detected by a fine-grained calorimeter, which also serves as a muon filter and a tracking device. The outer boundary of the detector is given by the iron return-yoke of a conventional magnet. The field is 0.5 T over a length of 12 m. The muon momentum measurement is performed by three sets of drift chambers in the central detector region. A forward–backward muon detection system extends the polar angle coverage to 22 degrees in the forward region. Radially inwards is a combined hadron calorimeter and muon absorber. The electromagnetic energy flow is determined by approximately 11000 crystals of BGO. Full electromagnetic shower containment over nearly 4π solid angle coverage is achieved. Surrounding the 10 cm diameter beam pipe, a high-precision Silicon Microstrip Detector (SMD) and a small drift chamber operating in the time expansion mode (TEC) act as charged particle vertex detectors. Taking data (July 96).

Journal papers NIM 214 (1983) 525, NIM A225 (1984) 493, NIM A228 (1985) 294, NIM A235 (1985) 464, NIM A251 (1986) 258, NIM A252 (1986) 304, CPC 45 (1987) 391, NIM A253 (1986) 15, NIM A254 (1987) 535, NIM A256 (1987) 261, NIM A257 (1987) 125, NIM A257 (1987) 528, HEPNP 12 (1987) 587, NIM A258 (1987) 58, NIM A263 (1988) 14, NIM A263 (1988) 343, NIM A265 (1988) 50, NIM A265 (1988) 252, NIM A270 (1988) 397, NIM A272 (1988) 713, NIM A273 (1988) 471, NIM A273 (1988) 814, NIM A274 (1989) 113, NIM A275 (1989) 71, NIM A275 (1989) 81, NIM A277 (1989) 187, NIM A278 (1989) 699, NIM A279 (1989) 671, NIM A280 (1989) 25, NIM A283 (1989) 799, NIM A285 (1989) 403, PL B231 (1989) 509, PL B233 (1989) 530, MPL A5 (1990) 1381, NIM A288 (1990) 364, NIM A289 (1990) 35, NIM A289 (1990) 103, NIM A289 (1990) 335, NIM A290 (1990) 115, PL B236 (1990) 109, PL B237 (1990) 136, PL B238 (1990) 122, PL B241 (1990) 416, PL B247 (1990) 177, PL B247 (1990) 473, PL B248 (1990) 203, PL B248 (1990) 227, PL B248 (1990) 464, PL B249 (1990) 341, PL B250 (1990) 183, PL B250 (1990) 199, PL B250 (1990) 205, PL B251 (1990) 311, PL B251 (1990) 321, PL B252 (1990) 511, PL B252 (1990) 518, PL B252 (1990) 525, PL B252 (1990) 703, PL B252 (1990) 713, NIM A302 (1991) 53, NIM A306 (1990) 150, NIM A309 (1991) 318, PL B257 (1991) 450, PL B257 (1991) 469, PL B259 (1991) 199, PL B261 (1991) 169, PL B261 (1991) 177, PL B262 (1991) 155, PL B263 (1991) 551, PL B265 (1991) 451, PL B270 (1991) 111, PL B271 (1991) 453, PL B271 (1991) 461, ZPHY C51 (1991) 179, PL B275 (1992) 209, PL B276 (1992) 247, PL B283 (1992) 454, PL B284 (1992) 471, PL B286 (1992) 403, PL B288 (1992) 395, PL B288 (1992) 404, PL B288 (1992) 412, PL B292 (1992) 454, PL B292 (1992) 463, PL B292 (1992) 472, PL B294 (1992) 457, PL B294 (1992) 466, PL B295 (1992) 337, PL B295 (1992) 371, PL B297 (1992) 469, ZPHY C55 (1992) 39, PL B301 (1993) 136, PL B303 (1993) 391, PL B306 (1993) 187, PL B307 (1993) 187, PL B307 (1993) 237, PL B309 (1993) 451, PL B313 (1993) 326, PL B315 (1993) 494, PL B316 (1993) 427, PL B317 (1993) 467, PL B317 (1993) 474, PL B317 (1993) 637, PL B318 (1993) 575, PRPL 236 (1993) 1, ZPHY C57 (1993) 355, NIM A340 (1994) 396, NIM A343 (1994) 456, NIM A344 (1994) 133, NIM A344 (1994) 212, NIM A344 (1994) 521, NIM A348 (1994) 431, NIM A348 (1994) 436, NIM A351 (1994) 300, IEEE TNS 41 (1994) 772, PL B321 (1994) 283, PL B328 (1994) 223, PL B332 (1994) 201, PL B335 (1994) 542, PL B341 (1994) 245, ZPHY C62 (1994) 551, PL B345 (1995) 74, PL B345 (1995) 93, PL B345 (1995) 589, PL B345 (1995) 609, PL B346 (1995) 190, PL B350 (1995) 109, PL B351 (1995) 375, PL B352 (1995) 487, PL B353 (1995) 136, PL B353 (1995) 145, PL B363 (1995) 118, PL B363 (1995) 127, PL B363 (1995) 137, PL B370 (1996) 195, PL B370 (1996) 211, PL B371 (1996) 126, PL B371 (1996) 137, and PL B374 (1996) 331.

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CERN-LEP-OPAL

(Proposed 1982, Approved Nov 1982, Began data-taking Aug 1989, In progress)

THE OPAL DETECTOR (AN OMNI PURPOSE APPARATUS FOR LEP)

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DEBRECEN, INST NUCL RES – J Palinkas

DUKE U – S Lautenschlager, A Lee

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VICTORIA U – D Deatrich, A Honma, R K Keeler, I Lawson, P Poffenberger, S Robertson, M J Roney, M Rosvick, T J Smith, R Sobie, M Vincter, J White
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Accelerator CERN-LEP *Detector* OPAL

Reactions

$e^+ e^-$	< 200 GeV (E_{cm})

Particles studied Z^0, W^+, W^-, γ, τ, hvy-flavor, gluon, higgs, s-particle

Brief description OPAL is a general purpose detector designed to study a wide range of unexplored physics at LEP. Among the central physics issues are the study of the Z^0 and $W^{\pm}$ bosons (*e.g.*, the determination of their exact masses and widths, and couplings to leptons and quarks), the physics of heavy flavors (such as the spectroscopy of b quarks and the determination of the mixing and lifetimes of B states), and various QCD topics. A general search for new particles, in particular the Higgs bosons, is being made. The main components of the apparatus, in order of increasing distance from the interaction point, are a silicon microvertex detector, central detectors consisting of a vertex and a jet chamber, and a barrel of Z chambers, a warm conductor solenoid providing a uniform magnetic field of 0.4 T, a TOF scintillator barrel detector complimented by a scintillating tile endcap detector, a 4π lead glass electromagnetic calorimeter, a hadron calorimeter instrumented by streamer tubes and thin gap wire chambers, an external muon identifier, and a forward detector which includes a new small-angle silicon–tungsten calorimeter. Taking data (July 96).

Journal papers NIM A236 (1985) 284, IEEE TNS 32 (1985) 736, NIM A242 (1986) 247, NIM A244 (1986) 416, NIM A250 (1986) 503, NIM A252 (1986) 331, NIM A252 (1986) 511, IEEE TNS 34 (1987) 240, CPC 47 (1987) 55, NIM A260 (1987) 132, NIM A260 (1987) 329, NIM A265 (1988) 11, NIM A265 (1988) 445, IEEE TNS 36 (1989) 380, NIM A278 (1989) 725, NIM A279 (1989) 236, NIM A279 (1989) 523, NIM A283 (1989) 492, NIM A283 (1989) 515, NIM A283 (1989) 650, PL B231 (1989) 530, IEEE TNS 37 (1990) 1584, NIM A286 (1990) 99, NIM A286 (1990) 107, NIM A286 (1990) 117, NIM A290 (1990) 76, NIM A293 (1990) 145, NIM A294 (1990) 431, PL B235 (1990) 379, PL B235 (1990) 389, PL B236 (1990) 224, PL B236 (1990) 364, PL B240 (1990) 250, PL B240 (1990) 261, PL B240 (1990) 497, PL B241 (1990) 133, PL B242 (1990) 299, PL B244 (1990) 135, PL B246 (1990) 285, PL B247 (1990) 448, PL B247 (1990) 458, PL B247 (1990) 617, PL B248 (1990) 211, PL B251 (1990) 211, PL B252 (1990) 159, PL B252 (1990) 290, ZPHY C47 (1990) 505, NIM A302 (1991) 434, NIM A305 (1991) 275, NIM A310 (1991) 527, PL B253 (1991) 511, PL B254 (1991) 293, PL B257 (1991) 531, PL B261 (1991) 334, PL B262 (1991) 341, PL B262 (1991) 351, PL B263 (1991) 123, PL B263 (1991) 311, PL B264 (1991) 219, PL B264 (1991) 467, PL B265 (1991) 462, PL B266 (1991) 201, PL B266 (1991) 485, PL B267 (1991) 143, PL B268 (1991) 122, PL B273 (1991) 338, PL B273 (1991) 355, ZPHY C49 (1991) 1, ZPHY C49 (1991) 49, ZPHY C49 (1991) 375, ZPHY C50 (1991) 373, ZPHY C52 (1991) 175, ZPHY C52 (1991) 543, NIM A313 (1992) 103, NIM A314 (1992) 74, NIM A317 (1992) 47, NIM A320 (1992) 183, NIM A323 (1992) 169, PL B274 (1992) 513, PL B276 (1992) 247, PL B276 (1992) 379, PL B276 (1992) 547, PL B278 (1992) 485, PL B281 (1992) 394, PL B281 (1992) 405, PL B287 (1992) 389, PL B287 (1992) 401, PL B288 (1992) 373, PL B291 (1992) 503, PL B294 (1992) 436, PL B295 (1992) 347, PL B295 (1992) 357, ZPHY C53 (1992) 539, ZPHY C54 (1992) 193, ZPHY C55 (1992) 1, ZPHY C55 (1992) 191, ZPHY C56 (1992) 521, NIM A324 (1993) 34, NIM A325 (1993) 129, NIM A325 (1993) 271, NIM A325 (1993) 494, NIM A333 (1993) 330, PL B298 (1993) 456, PL B302 (1993) 523, PL B305 (1993) 407, PL B305 (1993) 415, PL B307 (1993) 187, PL B307 (1993) 247, PL B311 (1993) 391, PL B312 (1993) 501, PL B313 (1993) 333, PL B316 (1993) 435, ZPHY C58 (1993) 207, ZPHY C58 (1993) 219, ZPHY C58 (1993) 387, ZPHY C58 (1993) 405, ZPHY C58 (1993) 523, ZPHY C59 (1993) 1, ZPHY C59 (1993) 183, ZPHY C60 (1993) 19, ZPHY C60 (1993) 199, ZPHY C60 (1993) 217, ZPHY C60 (1993) 397, ZPHY C60 (1993) 579, ZPHY C60 (1993) 593, ZPHY C60 (1993) 601, NIM A348 (1994) 409, NIM A348 (1994) 421, NIM A348 (1994) 424, PL B320 (1994) 417, PL B327 (1994) 397, PL B327 (1994) 411, PL B328 (1994) 207, PL B336 (1994) 585, PL B337 (1994) 196, PL B337 (1994) 207, PL B337 (1994) 393, PL B338 (1994) 497, PL B339 (1994) 278, NC 107A (1994) 2007, NC 107A (1994) 2055, ZPHY C61 (1994) 19, ZPHY C61 (1994) 199, ZPHY C61 (1994) 209, ZPHY C61 (1994) 357, ZPHY C63 (1994) 181, ZPHY C63 (1994) 197, ZPHY C63 (1994) 363, ZPHY C64 (1994) 1, PL B350 (1995) 273, PL B352 (1995) 176, PL B353 (1995) 402, PL B353 (1995) 595, PL B358 (1995) 162, PL B364 (1995) 93, ZPHY C65 (1995) 1, ZPHY C65 (1995) 17, ZPHY C65 (1995) 31, ZPHY C65 (1995) 47, ZPHY C65 (1995) 183, ZPHY C65 (1995) 367, ZPHY C66 (1995) 19, ZPHY C66 (1995) 31, ZPHY C66 (1995) 543, ZPHY C66 (1995) 555, ZPHY C67 (1995) 15, ZPHY C67 (1995) 27, ZPHY C67 (1995) 45, ZPHY C67 (1995) 57, ZPHY C67 (1995) 203, ZPHY C67 (1995) 365, ZPHY C67 (1995) 379, ZPHY C67 (1995) 389, ZPHY C67 (1995) 555, ZPHY C68 (1995) 1, ZPHY C68 (1995) 179, ZPHY C68 (1995) 203, ZPHY C68 (1995) 519, ZPHY C68 (1995) 531, ZPHY C68 (1995) 555, PL B368 (1996) 244, PL B369 (1996) 163, PL B370 (1996) 174, PL B370 (1996) 185, PL B374 (1996) 341, PL B376 (1996) 232, PL B376 (1996) 315, ZPHY C69 (1996) 195, ZPHY C69 (1996) 543, ZPHY C70 (1996) 197, ZPHY C70 (1996) 357, and ZPHY C71 (1996) 1.

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CERN-LEP-06

(Proposed 1988, Approved Sep 1989, Began data-taking 1990, Completed data-taking Feb 1992)

THE SEARCH FOR HIGHLY IONIZING PARTICLES IN e^+e^- COLLISIONS AT LEP USING MODAL

L6-MODAL COLLABORATION
ALBERTA U – J L Pinfold (✓ Spokesperson)
BOLOGNA U & INFN, BOLOGNA – G Giacomelli, F Patrizii, F Predieri, P Serra
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Accelerator CERN-LEP *Detector* Plastic

Reactions

$e^+ e^- \rightarrow$	90 GeV (E_{cm})

Particles studied monopole

Brief description The MODAL (MOnopole Detector At LEP) detector is designed to search for monopoles, dyons, and other highly ionizing particles. It is formed from lexan/CR39 dielectric track detector modules arranged in a polyhedral configuration around the intersection region.

Journal papers PR D46 (1992) 881.

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CERN-NA-012-2

(Proposed Aug 1985, Approved Feb 1986, Began data-taking Oct 1986, Completed data-taking Nov 1993)

SEARCH FOR MESONS AND GLUEBALLS DECAYING INTO MULTIPHOTON FINAL STATES PRODUCED IN CENTRAL HADRON COLLISIONS AND STUDY OF INCLUSIVE PRODUCTION OF HEAVY QUARK MESONS

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KEK – S Inaba, M Kobayashi, T Tsuru
LOS ALAMOS – D Alde, E A Knapp
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BRUSSELS U & BRUSSELS U, IISN – F Binon, J P Stroot (√ Spokesperson)
CHIBA U – H Kawai
MIYAZAKI U – T Nakamura, K Takamatsu
YAMAGATA U – H Shimizu
CERN – M Boutemeur

Accelerator CERN-SPS *Detector* GAMS-4000

Reactions

$\pi^- p \rightarrow p \pi^- 2\gamma$ (γ's)	300 GeV/c
$\pi^- p \rightarrow 2\gamma$ (γ's) X	"
$\pi^- n \rightarrow n \pi^- 2\gamma$ (γ's)	"
$\pi^- n \rightarrow 2\gamma$ (γ's) X	"
$p p \rightarrow 2p 2\gamma$ (γ's)	450 GeV/c

Particles studied glueball, exotic, meson^0, $\eta_c(1S)$, χ_c(unspec)

Brief description Searches for neutral mesons, exotics like glueballs, hybrids, and many-quark states produced in central hadron–proton collisions. Studies the inclusive hadronic production of neutral heavy quark mesons. Uses the 4092-cell electromagnetic calorimeter GAMS-4000 supplemented with a forward magnetic spectrometer and microstrip gas chambers. Data analysis in progress (July 96).

Journal papers NIM A268 (1988) 112, NIM A269 (1988) 101, PL B201 (1988) 160, YF 47 (1988) 1273, YF 47 (1988) 1639, NIM A276 (1989) 652, YF 49 (1989) 712, ZPHY C43 (1989) 541, DANS 316 (1991) 900, NIM A315 (1992) 21, NIM A342 (1994) 389, PL B340 (1994) 122, NC A107 (1994) 1867, NC A107 (1994) 1911, ZPHY C61 (1994) 35, YF 58 (1995) 662, DANS 344 (1995) 469, ZPHY C66 (1995) 375, and ZPHY C66 (1995) 379.

Related experiments CERN-NA-012, CERN-WA-091, CERN-WA-102

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CERN-NA-045-2

(Proposed Jan 1994, Approved Apr 1995, Began data-taking Nov 1995, In progress)

STUDY OF LOW-MASS ELECTRON PAIR AND PHOTON PRODUCTION IN LEAD–LEAD COLLISIONS

CERES COLLABORATION
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CERN – J Schukraft
DUBNA – G Agakichiev, Y Minaev, Y Panebrattsev, S Razin, S Shimanski, V Yurevich
DARMSTADT, GSI – P Braun-Munzinger, D Miskowiec
HEIDELBERG, MAX PLANCK INST – F Ceretto, U Faschingbauer, C Fuchs, M Hemberger, O Nix, J P Wurm
HEIDELBERG U, IHEP – R Baur, C Bormann, A Drees, S Esumi, P Glaessel, C H Jung, B Lenkeit, M Messer, A Pfeiffer, H J Specht, J Stachel, T S Ullrich, C Voigt, J P Wessels
MILAN POLYTECHNIC – E Gatti, M Sampietro
WEIZMANN INST – C P de los Heros, Z Fraenkel, I Ravinovich, E Socol, G Tel-Zur, I Tserruya (√ Spokesperson)

Accelerator CERN-SPS *Detector* Ring imaging Čerenkov, Drift chamber, Multiwire proportional chamber

Reactions

^{207}Pb nucleus $\rightarrow e^+ e^-$ X	160 GeV/c (P_{lab}/N)
^{207}Pb nucleus $\rightarrow e^+ e^- \gamma$ X	"

Brief description A continuation of the CERN-NA-045 experiment dedicated to the measurement of e^+e^- pairs and direct photons produced in nucleus–nucleus collisions. The main goal is the study of the e^+e^- pair continuum in the invariant mass region from 50 MeV/c^2 up to 2 GeV/c^2 in a search for thermal emission from the conjectured quark–gluon plasma. It also addresses the question of chiral symmetry restoration in high density matter through the study of the vector mesons ρ, ω and ϕ. The CERES spectrometer has been upgraded to cope with the higher multiplicities and background of the central Pb–nucleus collisions. The basic spectrometer consists of two ring imaging Čerenkov (RICH) detectors separated by a superconducting double solenoid. The main elements of the upgrade are additional detectors, two silicon radial-drift chambers (instead of one in the original setup) and a pad chamber (a large MWPC with pad readout) located behind the spectrometer. They allow real tracking and help the pattern recognition of the RICH detectors, by providing an a priori knowledge of the ring location in the UV counters. The two silicon radial-drift chambers allow precise vertex reconstruction and provide rapidity density information. They also play, together with the first RICH, a major role in the rejection of γ conversions and π^0-Dalitz decays. The upgrade includes also a new DAQ system with a rate capability higher by more than one order of magnitude compared to the one used in CERN-NA-045. Taking data (July 96).

Journal papers Includes the list of papers by the CERN-NA-045 experiment. IEEE TNS 35 (1988) 404, IEEE TNS 35 (1988) 432, NIM A273 (1988) 798, IEEE TNS 37 (1990) 241, IEEE TNS 39 (1992) 619, NIM A316 (1992) 259, NIM A326 (1993) 273, NP A553 (1993) 857c, NIM A343 (1994) 87, NIM A343 (1994) 231, NP A566 (1994) 87c, NP A566 (1994) 347c, PL B332 (1994) 471, NIM A355 (1995) 329, NP A590 (1995) 103c, and PRL 75 (1995) 1272.

Related experiments CERN-NA-045

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CERN-NA-047

(Proposed Dec 1988, Approved Apr 1989, Began data-taking Aug 1991, In progress)

MEASUREMENT OF THE SPIN DEPENDENT STRUCTURE FUNCTIONS OF THE NEUTRON AND PROTON

SPIN MUON COLLABORATION (SMC)
NIKHEF, AMSTERDAM – N de Groot, T J Ketel, E Kok, M Litmaath, J E J Oberski, H Postma, E P Sichtermann, R van Dantzig, G van Middelkoop
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CERN – P Hautle, C A Heusch, W Kroeger, J-M Le Goff, T O Niinikoski, U Stiegler, R Voss
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GKSS, GEESTHACHT – H Stuhrmann, R Willumeit, J Zhao
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BOGAZICI U – E Arik, T Cuhadar, E Gulmez
ISTANBUL, TECH U – T Akdogan, H Guven, C Ozben, I Reyhancan, G Unel
MAINZ U – E M Kabuss, G K Mallot, J Pretz, R Seitz, A Steinmetz, D von Harrach
MONS U – R Windmolders
MUNICH U – L Betev, A Staude, J Vogt

NAGOYA U – T Hasegawa, N Hayashi, N Horikawa, S Ishimoto, T Iwata, T Kageya, A Kishi, T Matsuda, K Mori, A Ogawa
NORTHEASTERN U – J Moromisato, E von Goeler
NORTHWESTERN U – D Fasching, D Miller, R Segel, P Shanahan, M Velasco
RICE U – B E Bonner, J Cranshaw, S Eichblatt, T Gaussiran, M Lowe, J B Roberts
SACLAY – N de Botton, E Burtin, A de Lesquen, F Feinstein, B Frois, F Lehar, A Magnon, F Marie, J Martino, F Perrot-Kunne, S Platchkov
SANTIAGO DE COMPOSTELA U – B Adeva, C Fernandez, J A Garzon, A Gomez, G Gracia, S Lopez-Ponte, C A Perez, M Plo, J Saborido
TEL AVIV U – J Lichtenstadt, I Sabo
TRIESTE U, IST FIS & INFN, TRIESTE – R Birsa, F Bradamante, A Bressan, M Clocchiatti, S Dalla Torre, M Giorgi, M Lamanna, A Martin, A Penzo, R Puntaferro, P Schiavon, F Simeoni, F Tessarotto, A Zanetti
UCLA – B Derro, C Dulya, G Igo, C Whitten
HOUSTON U – B Mayes, L Pinsky, J Pyrlik, R Weinstein
UPPSALA U – A Arvidson, P Bjorkholm, A Dyring, M Rodriguez
VIRGINIA TECH – D Crabb, J McCarthy
WARSAW, INST NUCL STUDIES – B Badelek, J Kiryluk, K Kurek, J Polec
SOLTAN INST, SWIERK – J Nassalski, E Rondio, A Sandacz, M Szleper, W Wislicki
YALE U – A Deshpande, S Dhawan, V W Hughes (Spokesperson), R Piegaia

Accelerator CERN-SPS *Detector* EMC

Reactions Polarized beam and target

muon $p \rightarrow$ muon X	100 – 200 GeV (E_{lab})
muon deut $\rightarrow$ muon X	"

Particles studied p, n, deut

Brief description Measures the spin-dependent asymmetries A_1 and A_2 in deep inelastic scattering of longitudinally polarized muons by longitudinally and transversely polarized protons and deuterons. Tests the nucleon spin structure and Ellis-Jaffe and Bjorken sum rules. The apparatus is the upgraded forward spectrometer which was used originally by the European and New Muon Collaborations. To minimize the systematic uncertainties the target contains two oppositely polarized cells, which are exposed to the muon beam simultaneously. The polarized target has a high cooling power and field homogeneity, and long target cells. It was used with proton (butanol beads) and deuteron target materials in previous years, and with proton material (ammonia) in 1996. Taking data (June 96).

Journal papers PL B302 (1993) 533, NIM A343 (1994) 400, NIM A349 (1994) 334, PL B320 (1994) 400, PL B329 (1994) 399, PL B336 (1994) 125, and PL B369 (1996) 93.

Related experiments CERN-NA-002, CERN-NA-009, CERN-NA-028, CERN-NA-037

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CERN-NA-048

(Proposed Jul 1990, Approved Nov 1991, In preparation)

A PRECISION MEASUREMENT OF ϵ'/ϵ IN CP-VIOLATING $K^0 \rightarrow 2\pi$ DECAYS

NA48 COLLABORATION
SACLAY – J Alitti, S Anvar, D Bederede, F Bugeon, J-B Cheze, M De Beer, P Debu, J L Fallou, A Givernaud, H Le Provost, F Louis, E Mazzucato, A Migliori, M Mur, B Peyaud, S Schanne, G Tarte, R Turlay, B Vallage
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EDINBURGH U – L Bertolotto, O Boyle, B Hay, A Main, N McKay, G Oakland, K J Peach, E Veitch, L L J Vick, A Walker
FERRARA U & INFN, FERRARA – D Bettoni, R Calabrese, P Dalpiaz, J Duclos, P Ferretti Dalpiaz, P Frabetti, A Gianoli, V Guidi, E Luppi, F Petrucci, L Piemontese, F Rossi, M Savrie
FLORENCE U & INFN, FLORENCE – A Bizetti, M Calvetti (√ Spokesperson), M Lenti, A Michetti
MAINZ U, INST PHYS – H-G Becker, T Beier, H Bluemer, B Bockholt, C Ebersberger, A Kalter, K Kleinknecht, H-C Knoeppler, U Koch, L Koepke, S Luitz, B Renk, J Scheidt, J Schmidt, V Schoenharting, J Staeck, R Wilhelm, A Winhardt, M Wittgen
VIENNA, OAW – H Dibon, M Jeitler, M Markytan, I Mikulec, G Neuhofer, M Pernicka, A Taurok, C E Wulz
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PISA U & INFN, PISA – A Bast, L Bertanza, A Bigi, P Calafiura, R Carosi, C Cerri, F Costantini, R Fantechi, F Fidecaro, B Gorini, F Laico, I Mannelli, V Marzulli, G M Pierazzini, F Raffaelli
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SIEGEN U – I Augustin, M Bender, G Gillessen, M Holder, W Otto, M Roschangar, C Schmitz, B Schofer, R Werthenbach, S Winkler
WARSAW U – A Chlopik, Z Guzik, J Nassalski, E Rondio, M Szleper, W Wislicki

Accelerator CERN-SPS *Detector* Calorimeter, Spectrometer

Particles studied K_S, K_L, Λ

Brief description The goal is to measure $\mathrm{Re}(\epsilon'/\epsilon)$ with an accuracy of 2×10^{-4}. The experiment uses the 450 GeV/c SPS proton beam to produce two nearly collinear K_S and K_L beams concurrently. Kaon decays are distinguished by tagging the protons generating the K_S component. The detector is optimized for the detection of $\pi^+\pi^-$ and $\pi^0\pi^0$ final states from neutral kaons with momenta between 70 and 170 GeV/c. Charged decays are measured in a magnetic spectrometer with a central dipole magnet and two sets of large and high-precision drift chambers on each side. Neutral decays are recorded in a homogeneous liquid krypton calorimeter designed for high rate capability, good energy and space resolution, and sub-nanosecond time resolution. This configuration permits collecting all four modes concurrently with minimal systematic error. Other components of the apparatus include a proton tagger, a hadron calorimeter, and counters to veto muons and particles outside the detector acceptance. The first charged kaon test data have been collected during 1995. The installation is being completed with the positioning of the LKr calorimeter (Summer 96). First data taking is expected in early 1997.

Journal papers NIM A316 (1992) 1, NIM A323 (1992) 393, NIM A344 (1994) 487, NIM A344 (1994) 507, NIM A360 (1995) 224, NIM A361 (1995) 466, NIM A365 (1995) 268, NIM A367 (1995) 263, NIM A370 (1996) 413, and NIM A373 (1996) 213.

Related experiments CERN-PS-195, FNAL-832

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WWW Home-page http://www1.cern.ch/NA48/Welcome.html

CERN-NA-050

(Proposed Nov 1991, Approved Feb 1992, Began data-taking Nov 1994, In progress)

STUDY OF MUON PAIRS AND VECTOR MESONS PRODUCED IN HIGH ENERGY Pb Pb INTERACTIONS

NA50 COLLABORATION

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CLERMONT-FERRAND U – A Baldit, J Castor, T Chambon, I Chevrot, A Devaux, B Espagnon, J Fargeix, P Force, G Landaud, L Luquin, S Mourgues, P Saturnini
CRACOW, INST PHYS NUCL TECH – W Dabrowski
CERN – C Lourenco, R Shahoian, P Sonderegger
LISBON, LIP – M C Abreu, P Bordalo, S Ramos, S Silva
MOSCOW, INR – Y K Gavrilov, M G Golubeva, M Gotra, T L Karavicheva, A B Kurepin, N S Topilskaya
ORSAY, IPN – J Astruc, C Gerschel, D Jouan, Y Le Bornec, X Tarrago, N Willis
ECOLE POLYTECHNIQUE – A Borhani, B Chaurand, F Fleuret, M Gonin, L Kluberg (√ Spokesperson), P Petiau, A Romana
STRASBOURG, CRN – P Gorodetzky, C Racca
TURIN U & INFN, TURIN – S Alessandro, S Beole, G Bonazzola, E Chiavassa, G Dellacasa, N De Marco, M Gallio, P Giubellino, P Guaita, M Idzik, A Marzari Chiesa, M Masera, A Musso, A Piccotti, W L Prado da Silva, L Ramello, P Rato Mendes, L Riccati, E Scomparin, E Vercellin
LYON, IPN – M Bedjidian, F Bellaiche, B Cheynis, O Drapier, J Y Grossiord, A Guichard, R Haroutunian, M Jacquin, F Malek, J R Pizzi
YEREVAN PHYS INST – A A Grigoryan, H R Gulkanyan, R S Hakobyan, S S Mehrabyan

Accelerator CERN-SPS *Detector* Calorimeter, Spectrometer

Reactions

Pb nucleus → $\mu^+ \mu^-$ X	160 GeV (T_{lab}/N)

Particles studied vmeson

Brief description Studies dimuons produced in Pb–Pb collisions at the nucleon–nucleon $E_{c.m.}$ of 18 GeV. The setup is optimized for a mass range which includes signals probing QGP (Quark and Gluon Plasma), namely ϕ, J/ψ, ψ', and (unseparated) ρ and ω vector mesons. It also covers Drell-Yan dimuons which serve as a normalization. The detector is an improved version of the CERN-NA-038 setup, with neutral energy and multiplicity detectors following the target, the Zero Degrees quartz fiber hadron calorimeter (ZDC) embedded in the hadron dump, and a muon spectrometer following the dump. Taking data (June 96).

Related experiments CERN-NA-038

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WWW Home-page http://www.cern.ch/NA50/

CERN-NA-051

(Proposed Apr 1992, Approved Apr 1992, Began data-taking Jun 1992, Completed data-taking Jul 1992)

DRELL-YAN STUDY OF SEA ISOSPIN SYMMETRY

NA51 COLLABORATION
CERN – P Sonderegger
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ORSAY, IPN – C Gerschel, D Jouan, X Tarrago
ECOLE POLYTECHNIQUE – B Chaurand, L Kluberg (√ Spokesperson), A Romana
STRASBOURG, CRN – P Gorodetzky, D Lazic, R Mazini, C Racca
TURIN U & INFN, TURIN – B Alessandro, E Chiavassa, G Dellacasa, M Gallio, P Giubellino, P Guaita, A Marzari-Chiesa, M Masera, M Monteno, A Musso, L Ramello, L Riccati, E Scomparin, E Vercellin
LYON, IPN – M Bedjidian, D Contardo, E Descroix, O Drapier, J Y Grossiord, A Guichard, R Haroutunian, F Malek, R Mandry, J R Pizzi

Accelerator CERN-SPS *Detector* Spectrometer

Reactions

$p\ p \rightarrow \mu^+ \mu^-$ X	450 GeV/c (P_{lab})
p deut → $\mu^+ \mu^-$ X	"

Brief description The purpose of the experiment is to study the isospin symmetry in the light-quark sea of the proton. Its violation is one possible explanation of recent unexpected muon deep inelastic scattering experimental results which disagree with the Gottfried sum rule. The experiment makes use of the large acceptance muon spectrometer used previously by CERN-NA-010 and CERN-NA-038. It detects muon pairs produced by the Drell–Yan mechanism in pp and pd reactions. A beam of 450 GeV/c protons impinges on alternating liquid hydrogen and deuterium targets. The aim is to measure the cross-section ratio at dimuon masses above 4 GeV/c^2, which is a sensitive probe of the relative content of light antiquarks $\overline{u}$ and $\overline{d}$ in the proton sea.

Journal papers PL B332 (1994) 244.

Related experiments FNAL-288, FNAL-711

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WWW Home-page http://lyoinfo.in2p3.fr/eiexp/na51.html

CERN-PS-185-2

(Proposed Jan 1992, Approved Nov 1992, Began data-taking Jul 1994, Completed data-taking Jun 1995)

HIGH PRECISION MEASUREMENT OF $\overline{p}p \rightarrow \overline{\Lambda}\Lambda$ CROSS-SECTIONS IN THE MASS REGION AROUND 2232 MeV/c^2

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ERLANGEN U – H Dennert, W Eyrich, J Hauffe, F Stinzing
FREIBURG U – D Afzali, J Franz, J Rauch, E Roessle, M Ruh, D Ruschmeier, H Schmitt, R Todenhagen, T Walter, H Wirth
JULICH, FORSCHUNGSZENTRUM – R Broeders, R Geyer, K Kilian (√ Spokesperson), W Oelert, K Roehrich (√ Spokesperson), K Sachs, T Sefzick
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ILLINOIS U, URBANA – R A Eisenstein, P Harris, D Hertzog, T Jones, R Tayloe
NEW MEXICO U – H Fischer
UPPSALA U – T Johansson, E Traneus

Accelerator CERN-LEAR *Detector* Wire chamber

Reactions

$\overline{p}\ p \rightarrow \overline{\Lambda}\ \Lambda$	1.435 – 1.450 GeV/c (P_{lab})

Brief description The aim of the experiment is to verify a possible structure in the excitation function of the reaction $\overline{p}p \rightarrow \overline{\Lambda}\Lambda$ indicated by the recent threshold data of the CERN-PS-185 collaboration at an invariant mass of about 2232 MeV/c^2. Studies the total and differential cross-sections as well as polarizations and spin correlations, within a few MeV around the reaction threshold. Uses an upgraded version of the PS-185 detector. The full $\overline{\Lambda}\Lambda$ kinematics is reconstructed from tracks in a 30 cm long stack of MWPC's and drift chambers. The production vertex is reconstructed by making use of four planes of μ-strip counters upstream the CH_2 sandwich target. Hyperon and antihyperon are distinguished by means of a magnetic solenoid with three drift chambers inside. The setup provides a large acceptance, a high efficiency, and a low annihilation background.

Related experiments CERN-PS-185, CERN-PS-185-3

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WWW Home-page
http://hpfr02.physik.uni-freiburg.de/ps185/ps185.html

CERN-PS-195

(Proposed Jan 1985, Approved Sep 1985, Began data-taking 1991, In progress)

TESTS OF CP VIOLATION WITH $\overline{K}^0$ AND K^0 AT LEAR

CPLEAR COLLABORATION
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BOSTON U – M Chertok, D Francis, J P Miller, B L Roberts, D Zimmerman
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CERN – P Bloch, M Fidecaro, T Ruf, A Schopper, C Touramanis
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IOANNINA U – I Evangelou, N Manthos, F Triantis
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ZURICH, ETH – O Behnke, W Fetscher, H J Gerber, B Pagels, M Schaefer, P Weber, M Wolter

Accelerator CERN-LEAR *Detector* Spectrometer, Calorimeter

Reactions

$\overline{p}\ p \rightarrow K^0$ X	0 GeV/c
$\overline{p}\ p \rightarrow \overline{K}^0$ X	"

Particles studied K^0, $\overline{K}^0$

Brief description Measures time-dependent K^0–$\overline{K^0}$ decay rate asymmetries for nonleptonic and semileptonic decays. They are sensitive to CP and T violation in different and complementary ways, and also provide sensitive tests of CPT. A beam of 10^6 $\overline{p}$/sec provided by LEAR is brought to rest in a hydrogen gas target, producing K^0 and $\overline{K}^0$ through the reaction $\overline{p}p \rightarrow K^{\pm}\pi^{\mp}K^0(\overline{K}^0)$. Decays of the K^0 and $\overline{K}^0$ are recorded under the same operating conditions, inside a magnetic field and using tracking chambers and a gas sampling electromagnetic calorimeter. The strangeness of the neutral kaon is tagged by detecting the sign of accompanying charged kaon identified by Čerenkovs and scintillators. Hardware processors are used to reconstruct and select different decay topologies on-line in less than 25 microseconds. Taking data (July 96).

Journal papers NIM A279 (1989) 285, NIM A279 (1989) 305, NIM A279 (1989) 317, NIM A283 (1989) 484, NC 102A (1989) 127, NIM A297 (1990) 126, NIM A301 (1991) 424, NP (PROC SUPPL) 24A (1991) 45, PL B267 (1991) 154, NIM A311 (1992) 78, NIM A321 (1992) 458, NIM A323 (1992) 511, NP (PROC SUPPL) 27 (1992) 285, PW 3 (1992) 40, PL B286 (1992) 180, SJNP 55 (1992) 840, NIM A333 (1993) 93, NIM A333 (1993) 513, NP (PROC SUPPL) 31 (1993) 196, NP A558 (1993) 43c, NP A558 (1993) 437c, NP A558 (1993) 449c, PAN 57 (1994) 1772, ZPHY C63 (1994) 541, PL B363 (1995) 237, PL B363 (1995) 243, PL B364 (1995) 239, ZPHY C65 (1995) 199, NIM A368 (1996) 666, PL B369 (1996) 367, PL B370 (1996) 167, PL B374 (1996) 313, and ZPHY C70 (1996) 211.

Related experiments CERN-NA-048, FNAL-621, FNAL-832

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WWW Home-page http://www1.cern.ch/cplear/Welcome.html

CERN-PS-196

(Proposed Mar 1985, Approved Nov 1985, In progress)

PRECISION COMPARISON OF $\overline{p}$ AND p MASSES IN A PENNING TRAP

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SEOUL NATIONAL U – W Jhe

Accelerator CERN-LEAR *Detector* Other

Particles studied $\overline{p}$

Brief description Compares p and $\overline{p}$ masses to an accuracy of one part in 10^{10} within a small volume of an ion trap, and develops trapping and cooling techniques to allow the production and study of low energy antiprotons and antihydrogen. Antiprotons have been trapped below 3 keV. Electron cooling from keV to $< 10^{-3}$ eV has been observed in the trap. Also measures the antiproton storage lifetime. First attempt to make cold antihydrogen is scheduled for late 1996. Taking data through Dec 96.

Journal papers PRL 57 (1986) 2504, RSI 58 (1987) 2197, PL A129 (1988) 38, PRL 63 (1989) 1360, PRL 65 (1990) 1317, PRL 74 (1995) 3544, PRL 75 (1995) 806, and PRL 77 (1996) (in press).

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CERN-PS-197

(Proposed Oct 1985, Approved Apr 1986, Began data-taking 1989, In progress)

THE CRYSTAL BARREL: MESON SPECTROSCOPY AT LEAR WITH A 4π DETECTOR

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BUDAPEST, CRIP – P Hidas
CERN – M Doser, J Kisiel, R Landua, L Montanet, R Ouared, U Wiedner
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HAMBURG U – J Meier, P Schmidt, R Seibert, U Strohbusch
KARLSRUHE U – S Bischoff, P Bluem, D Engelhardt, C Holtzhaussen, M Tischhaeuser
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Accelerator CERN-LEAR *Detector* CRYSTAL-BARREL

Reactions

$\overline{p}\ p \rightarrow$ annihil	0–2000 MeV/c
$\overline{p}\ n \rightarrow$ annihil	"

Particles studied glueball, meson

Brief description The spectrometer is designed to provide complete and precise information on nearly every final state produced in $\overline{p}p$ and $\overline{p}d$ annihilations at low energy and to collect high statistics data samples. The physics goal is to identify all light mesons in the mass range from 0.14 to 2.3 GeV/c^2, to determine their properties and the annihilation dynamics, and to search for the glueball and hybrid degrees of freedom. The apparatus consists of a barrel shaped electromagnetic calorimeter with 1380 CsI(Tl) crystals read out by photodiodes, a cylindrical jet drift chamber, a silicon μ-strip vertex detector, and silicon hodoscopes. The whole detector is embedded in a solenoidal magnet with field strength up to 1.5 T. Uses liquid and gaseous H_2 and D_2 targets. Scheduled to run till the end of 1996.

Journal papers NP (PROC SUPPL) 8 (1989) 65, PL B260 (1991) 249, NP A527 (1991) 491c, IEEE TNS 39 (1992) 826, NIM A321 (1992) 69, PL B291 (1992) 347, PL B294 (1992) 451, PL B297 (1992) 214, SJNP 55 (1992) 767, PL B311 (1993) 362, PL B311 (1993) 371, PL B319 (1993) 373, ZPHY C58 (1993) 175, PAN 57 (1994) 1711, PL B322 (1994) 431, PL B323 (1994) 233, PL B327 (1994) 425, PL B333 (1994) 271, PL B333 (1994) 277, PL B340 (1994) 259, PAN 57 (1994) 1465 = YF 57 (1994) 1542, NC 107A (1994) 1815, ZPHY A351 (1994) 325, PL B342 (1995) 433, PL B346 (1995) 203, PL B346 (1995) 363, PL B352 (1995) 187, PL B353 (1995) 571, PL B355 (1995) 425, and PL B358 (1995) 389.

Related experiments CERN-PS-201

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WWW Home-page http://www.phys.cmu.edu/cb/cb.html

CERN-PS-201

(Proposed Jan 1986, Approved Sep 1986, Began data-taking Aug 1990, In progress)

STUDY OF ANTINUCLEON ANNIHILATIONS AT LEAR WITH OBELIX, A LARGE-ACCEPTANCE AND HIGH RESOLUTION DETECTOR BASED ON THE OPEN AXIAL FIELD SPECTROMETER

OBELIX COLLABORATION

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CAGLIARI U & INFN, CAGLIARI – A Adamo, C Cicalo, A Lai, A Masoni, L Musa, G Puddu, S Serci, P Temnikov, G L Usai
DUBNA – O Y Denisov, O E Gorchakov, V P Nomokonov, S N Prakhov, A M Rozhdestvensky, M G Sapozhnikov, V I Tretyak
FRASCATI – P Gianotti, C Guaraldo, A Lanaro, V Lucherini, F Nichitiu, C Petrascu, A Rosca
LEGNARO – V G Ableev, C Cavion, U Gastaldi, L Lombardi, G Maron, R A Ricci, L Vannucci, G Vedovato
PADUA U & INFN, PADUA – A Andrighetto, M Morando
PAVIA U & INFN, PAVIA – G Bendiscioli, V Filippini, A Fontana, C Marciano, P Montagna, A Rotondi (√ Spokesperson), A Saino, P Salvini
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TURIN U & INFN, TURIN – F Balestra, G C Bonazzola, E Botta, T Bressani, M P Bussa, L Busso, D Calvo, P Cerello, S Costa, D D'Isep, L Fava, A Feliciello, L Ferrero, A Filippi, R Garfagnini, A Grasso, A Maggiora, S Marcello, D Panzieri, D Parena, E Rossetto, F Tosello, G Zosi
TRIESTE U, IST FIS & INFN, TRIESTE – G Margagliotti, G Pauli, S Tessaro
UDINE U & INFN, UDINE – L Santi

Accelerator CERN-LEAR *Detector* Spectrometer

Reactions

$\overline{p}\ p \rightarrow$ annihil	0–0.2 GeV/c (P_{lab})
$\overline{p}$ deut $\rightarrow$ annihil	"
$\overline{p}$ nucleus $\rightarrow$ annihil	"
$\overline{n}\ p \rightarrow$ annihil	0–0.4 GeV/c (P_{lab})
$\overline{n}$ nucleus $\rightarrow$ annihil	"

Particles studied mesons

Brief description Studies (1) spectroscopy of $q\overline{q}$, exotic, glueball, and hybrid mesons, (2) dynamics of $N\overline{N}$ interactions, (3) atomic physics with $\overline{p}$'s, and (4) $\overline{p}$ annihilations onto more than one nucleon. A Spiral Projection Chamber (SPC) is used as vertex detector. The magnet and the jet drift chamber of the Open Axial Field Spectrometer (AFS) are used for charged particles momentum and dE/dx measurements. Two concentric arrays of plastic scintillators identify and trigger on charged kaons. Gamma showers are reconstructed in three dimensions with gas sampling calorimeter moduli. Taking data (July 96). Scheduled to complete the data taking by the end of 1996.

Journal papers IEEE TNS 38 (1991) 331, IEEE TNS 38 (1991) 337, IEEE TNS 38 (1991) 393, NIM A306 (1991) 305, PL B256 (1991) 349, NIM A323 (1992) 523, PL B284 (1992) 448, PL B285 (1992) 15, PL B287 (1992) 368, SJNP 55 (1992) 806, NIM A325 (1993) 417, NIM A334 (1993) 391, NP A553 (1993) 651c, NP A558 (1993) 13c, NP A558 (1993) 137c, NP A558 (1993) 369c, NP A558 (1993) 665c, NP A562 (1993) 617, PR A47 (1993) 4517, PL B329 (1994) 407, PL B334 (1994) 237, PL B337 (1994) 226, PAN 57 (1994) 1614 = YF 57 (1994) 1684, PAN 57 (1994) 1716 = YF 57 (1994) 1787, PAN 57 (1994) 1745 = YF 57 (1994) 1816, NC A107 (1994) 943, NC A107 (1994) 1325, NC A107 (1994) 2837, NP A569 (1994) 761, NIM A356 (1995) 270, PL B361 (1995) 187, PRL 74 (1995) 371, NP A585 (1995) 577, NP A594 (1995) 375, and PL B369 (1996) 77.

Related experiments CERN-PS-195, CERN-PS-197, CERN-PS-202, BNL-852, FNAL-760

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CERN-PS-202

(Proposed 1986, Approved Feb 1987, Began data-taking Jul 1991, Completed data-taking Sep 1994)

JETSET: PHYSICS AT LEAR WITH AN INTERNAL GAS JET TARGET AND AN ADVANCED GENERAL PURPOSE DETECTOR

PS202 COLLABORATION

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CERN – D Drijard, M Ferro-Luzzi, R Jones, B Mouellic, J M Perreau, M J Price
ERLANGEN U – W Eyrich, R Geyer, S Pomp, F Stinzing
FREIBURG U – H Fischer, J Franz, E Roessle, H Schmitt, M Tscheulin, H J Urban, H Wirth
GENOA U & INFN, GENOA – A Buzzo, M Lovetere, M Macri (√ Spokesperson), M Marinelli, S Passaggio, M G Pia, A Pozzo, E Robutti, A Santroni
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KERNFORSCHUNGSANLAGE, JULICH – K Kilian, W Oelert, K Roehrich, M Rook, O Steinkamp
OSLO U – H Korsmo
UPPSALA U – T Johansson

Accelerator CERN-LEAR *Detector* JETSET

Reactions

$\overline{p}\ p \rightarrow \phi\ \phi$	0.6–1.9 GeV/c
$\overline{p}\ p \rightarrow K^+\ K^-\ K^+\ K^-$	"
$\overline{p}\ p \rightarrow K_S\ K_S$	"

Particles studied glueball

Brief description Uses an internal gas jet target surrounded by an advanced, compact, nonmagnetic detector. Aim is a search for glueballs (gg or ggg) and hybrids ($gq\overline{q}$) over the mass range 2.04 to 2.4 GeV/c^2. Data analysis in progress (July 96).

Journal papers NP (PROC SUPPL) 8 (1989) 69, SJNP 55 (1992) 827, NIM A335 (1993) 255, NP A558 (1993) 27c, NIM A346 (1994) 57, NC 107A (1994) 2329, PAN 57 (1994) 1503 = YF 57 (1994) 1578, and PL B345 (1995) 325.

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CERN-UA-004-2

(Approved Jul 1990, Completed data-taking)

A PRECISE MEASUREMENT OF THE REAL PART OF THE ELASTIC SCATTERING AMPLITUDE AT THE S$\overline{p}p$S

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ECOLE POLYTECHNIQUE – C Augier, D Bernard, J Bourotte, M Haguenauer (Spokesperson)

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ROME U, TORVERGATA & INFN, ROME – R Cardarelli, L Cerrito, G Matthiae, F Natali
VALENCIA U – F Alted, R Cases, E Sanchis, J Velasco

Accelerator CERN-PBAR/P *Detector* Wire chamber

Reactions

$\overline{p}\ p \rightarrow \overline{p}\ p$	630 GeV (E_{cm})

Brief description Measures the total cross-section and the ratio ρ of the real to the imaginary part of the forward elastic scattering amplitude. The setup is composed of two pairs of Roman Pots placed symmetrically at 45 m from the crossing point. The horizontal scattering angle is measured by drift chambers and the vertical coordinate is obtained by using a hodoscope. Data analysis in progress (June 96).

Journal papers PL B315 (1993) 503, PL B316 (1993) 448, and PL B344 (1995) 451.

Related experiments CERN-UA-004

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CERN-WA-079

(Proposed Apr 1983, Approved Jun 1983, Began data-taking Aug 1986, Completed data-taking Aug 1991)

STUDY OF NEUTRINO–ELECTRON SCATTERING AT THE SPS

CHARM-II COLLABORATION
BRUSSELS U, IIHE – P Vilain, G Wilquet
CERN – R Beyer, W Flegel, H Grote, T Mouthuy, H Overas, J Panman, A Rozanov, K Winter (√ Spokesperson), G Zacek, V Zacek
HAMBURG U – F W Busser, C Foos, L Gerland, T Layda, F Niebergall, G Radel, P Stahelin, T Voss
LOUVAIN U – D Favart, G Gregoire, E Knoops, V Lemaitre
MOSCOW, ITEP – P Gorbunov, E A Grigoriev, V D Khovansky, A Maslennikov
MUNICH U, EXP PHYS – W Lippich, A Nathaniel, A Staude, J Vogt
NAPLES U, IFS & INFN, NAPLES – A G Cocco, A Ereditato, G Fiorillo, F Marchetti-Stasi, V Palladino, P Strolin
INFN, ROME – A Capone, D De Pedis, U Dore, A Frenkel-Rambaldi, P F Loverre, D Macina, G Piredda, R Santacesaria
FERRARA U & INFN, FERRARA – E Di Capua, S Ricciardi, B Saitta
MIDDLE EAST TECH U, ANKARA – B Akkus, E Arik, M Serin-Zeyrek, R Sever, P Tolun
BERLIN-ZEUTHEN ADW – K Hiller, R Nahnhauer, H E Roloff

Accelerator CERN-SPS *Detector* CHARM-II

Reactions

$\nu_\mu\ e^-$	5–100 GeV/c
$\overline{\nu}_\mu\ e^-$	"

Brief description Aims at determining the electroweak mixing angle θ_W and the ratio g_A/g_V from the ratio of νe^- and $\overline{\nu} e^-$ scattering cross-sections. The obtained values are to be compared to those determined with 10^6 times larger Q^2 at LEP. The CHARM-II neutrino detector consists of a massive, fine-grained, and low-density electronic calorimeter, followed by a muon spectrometer made of magnetized iron, with scintillators and drift chambers as active elements. The measurements are performed in the horn-focused wide band neutrino beam.

Journal papers NIM A252 (1986) 443, NIM A260 (1987) 368, NIM A263 (1988) 109, PL B213 (1988) 554, NIM A277 (1989) 83, NIM A277 (1989) 170, NIM A278 (1989) 670, PL B231 (1989) 317, PL B232 (1989) 539, PL B245 (1990) 271, PL B247 (1990) 131, NP (PROC SUPPL) 19 (1991) 306, PL B259 (1991) 499, PL B281 (1992) 159, PL B302 (1993) 351, PL B309 (1993) 463, PL B313 (1993) 267, PL B320 (1993) 203, PL B332 (1994) 465, PL B335 (1994) 246, ZPHY C64 (1994) 539, PL B343 (1995) 453, PL B345 (1995) 115, and PL B364 (1996) 121.

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CERN-WA-085

(Proposed Oct 1984, Mar 1987, Approved Apr 1987, Began data-taking Oct 1987, Completed data-taking Sep 1991)

STUDY OF HIGH ENERGY NUCLEUS–NUCLEUS INTERACTIONS USING THE Ω′ SPECTROMETER EQUIPPED WITH A MULTIPARTICLE HIGH $p_\perp$ DETECTOR

WA85 COLLABORATION
ATHENS U – S Abatzis, G Vassiliadis
BARI U – N Di Bari, D Elia, R Fini, B Ghidini, A Jacholkowski, V Lenti, R A Loconsole, V Manzari, F Navach
BERGEN U – H Helstrup
BIRMINGHAM U – R Barnes, A C Bayes, J N Carney, J P Davies, D Evans (√ Spokesperson), J B Kinson, A Kirk, M Venables, O Villalobos-Baillie, M F Votruba
CERN – A Andrighetto, F Antinori, W Beusch, J P Dufey, B R French, A K Holme, K Knudson, J C Lassalle, E Quercigh, L Rossi, K Safarik
MADRID, CIEMAT – B de la Cruz
COLLEGE DE FRANCE – M Benayoun, J Kahane, P Leruste, J L Narjoux, M Sene, R Sene, A Volte
OSLO U – J A Lien, T Storas

Accelerator CERN-SPS *Detector* OMEGA-PRIME

Reactions

p Wt	200 GeV (T_{lab})
^{32}S Wt	200 GeV (T_{lab}/N)

Particles studied K^0, Λ, $\overline{\Lambda}$, Ξ^-, $\overline{\Xi}^+$, Ω^-, $\overline{\Omega}^+$

Brief description An exploratory experiment to look for new physics, and particularly for evidence of a quark–gluon plasma, through an increase in strange particle and antiparticle production. Some of the goals are a study of Ξ and anti-Ξ production, and the full reconstruction of Ω and anti-Ω hyperons. Also compares the strange and multistrange particle (anti-particle) productions in p W and S W interactions. Data analysis in progress (July 96).

Journal papers NP A498 (1989) 369c, PL B244 (1990) 130, NP (PROC SUPPL) 16 (1990) 409, PL B259 (1991) 508, PL B270 (1991) 123, NP A525 (1991) 441c, NP A525 (1991) 445c, NP A544 (1992) 321c, PL B316 (1993) 615, NP A566 (1994) 225c, NP A566 (1994) 491c, PL B347 (1995) 158, PL B355 (1995) 401, PL B359 (1995) 382, and NP A590 (1995) 307c.

Related experiments CERN-WA-094, CERN-WA-097

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CERN-WA-089

(Proposed Aug 1987, Aug 1987, Approved Feb 1988, Began data-taking 1990, Completed data-taking Sep 1994)

NEW HYPERON BEAM EXPERIMENT AT THE CERN-SPS USING THE OMEGA FACILITY

BRISTOL U – D Newbold, V Smith
CERN – W Beusch, W Klempt
GENOA U & INFN, GENOA – D Barberis, L Rossi
GRENOBLE U – C Berat, M Buenerd, F Charignon, J Chauvin, A Fournier, P Martin, M Rey-Campagnolle, E Vesin
HEIDELBERG, MAX PLANCK INST – E Albertson, M Beck, S Brons, W Brueckner, C Buescher, U Dersch, F Dropmann, S G Gerassimov, M Godbersen, T Haller, M Heidrich, K Koenigsmann, I Konorov, D Maier, S Masciocci, R Michaels, C Newsom, S Paul (Spokesperson), B Povh, Z Ren, L Schmitt, A Trombini, K Vorwalter, R Werding, E Wittmann, M Zizelsberger
HEIDELBERG U – M Boss, P Lennert, K Martens, H Rieseberg, H W Siebert, A Simon, O Thilmann, G Waelder
MAINZ U, INST KERNPHYS – E Chudakov, U Mueller, G Rosner, H Rudolph, B Volkemer, T Walcher
LEBEDEV INST – M I Adamovich, Y A Alexandrov, M V Zavertyaev
RUTGERS U – R Ransome

Accelerator CERN-SPS *Detector* OMEGA

Reactions

Σ^- Cu	330 GeV/c (P_{lab})
Σ^- C	"
Ξ^- Cu	270 GeV/c (P_{lab})
Ξ^- C	"
Ω^- Cu	"
Ω^- C	"

Particles studied Λ_c^+, $\Sigma_c(2455)$, Ξ_c^0, Ξ_c^+, Ω_c^0, Ω^-, Ω^*(unspec), Ξ^*(unspec), dibaryon($S=-2$), $U(3100)$

Brief description The aims are (1) to study charmed strange baryons, (2) to see if the $U(3100)$ actually exists, (3) to study Ω decays and Ξ and Ω resonances, (4) to look for H, the doubly strange dibaryon, (5) to measure semileptonic decays of charmed particles, (6) to study hyperon polarization phenomena, and (7) to study $\Sigma^- e^-$ elastic scattering. Uses the upgraded OMEGA facility and a hyperon beam installed at the end of the H1 beamline. Data analysis in progress (July 96).

Journal papers NIM A313 (1992) 203, NIM A313 (1992) 345, NIM A313 (1992) 429, NIM A323 (1992) 373, NIM A338 (1994) 310, NIM A342 (1994) 364, NIM A343 (1994) 60, NIM A343 (1994) 258, NIM A343 (1994) 279, NIM A348 (1994) 444, NIM A355 (1995) 351, NIM A357 (1995) 274, PL B358 (1995) 151, ZPHY A350 (1995) 379, NIM A371 (1996) 27, and NIM A371 (1996) 192.

Related experiments CERN-WA-062

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WWW Home-page http://vsnhd1.cern.ch/

CERN-WA-091

(Proposed Jan 1990, Approved Apr 1990, Began data-taking Jun 1991, Completed data-taking Jun 1994)

SEARCH FOR CENTRALLY PRODUCED NON-$q\bar{q}$ MESONS IN PROTON–PROTON INTERACTIONS AT 450 GeV/c BY USING THE CERN Ω SPECTROMETER

WA91 COLLABORATION

ATHENS U – S Abatzis, G Vassiliadis
BARI U & INFN, BARI – N Di Bari, R Fini, B Ghidini, V Lenti, A Loconsole, V Manzari, F Navach
BIRMINGHAM U – A C Bayes, J N Carney, S Clewer, J P Davies, C J Dodenhoff, J B Kinson, K Norman, O Villalobos-Baillie, M F Votruba
CERN – F Antinori, D Barberis, W Beusch, D Evans, B R French, A Jacholkowski, A Kirk (√ Spokesperson), K Knudson, J C Lassalle, E Quercigh
DUBNA – Y Kulchitsky, S Maljukov, I Minashvili, V Romanovsky, N Russakovich, A Semenov, A Soloviev, G Tchlatchidze
COLLEGE DE FRANCE – M Sene, R Sene

Accelerator CERN-SPS *Detector* OMEGA

Reactions

$p\ p \rightarrow p\ p$ X	450 GeV/c

Particles studied mesons

Brief description A search for new, non-$q\bar{q}$ states in the central region, with at least 10 times the statistics of the CERN-WA-076 experiment. Uses a liquid hydrogen target. Data analysis in progress (July 96).

Journal papers PL B324 (1994) 509, NC 107A (1994) 1557, and PL B353 (1995) 589.

Related experiments CERN-WA-076, CERN-WA-102

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CERN-WA-092

(Proposed Mar 1990, Approved Jul 1990, Began data-taking Jun 1992, Completed data-taking Sep 1993)

MEASUREMENT OF BEAUTY PARTICLE LIFETIMES AND HADROPRODUCTION CROSS-SECTIONS

BEATRICE COLLABORATION

BOLOGNA U & INFN, BOLOGNA – A Forino, R Gessaroli, L Malferrari, P Mazzanti, A Quareni
CERN – F Antinori, W Beusch, J P Dufey, P Farthouat, B R French, A Kirk, J C Lassalle, M Passaseo, V Ryzhov, G Schuler
DUBNA – S Maljukov, I Minashvili, N Russakovich, A Semenov, A Soloviev
GENOA U & INFN, GENOA – M Adinolfi, D Barberis, M Dameri, G Darbo, R Hurst, P Martinengo, B Osculati, L Rossi (√ Spokesperson), C Salvo
IMPERIAL COLL – D Barney, J Batten, A Duane, N Hummadi, D M Websdale
LEBEDEV INST – M Adamovich, Y Alexandrov, P Nechaeva, M Zavertyaev
PISA U & INFN, PISA – C Angelini, A Cardini, V Flaminio, C Lazzeroni, C Roda
ROME U & INFN, ROME – C Bacci, F Ceradini, G Ciapetti, A Frenkel, K Harrison, F Lacava, G Martellotti, A Nisati, D Orestano, G Penso, E Petrolo, L Pontecorvo, M Torelli, S Veneziano, M Verzocchi, L Zanello
ROME U, TORVERGATA & INFN, ROME – R Cardarelli, A Di Ciaccio, R Santonico
SOUTHAMPTON U – J G McEwen

Accelerator CERN-SPS *Detector* OMEGA-PRIME

Reactions

π^- nucleus $\rightarrow B\ \overline{B}$ X	350 GeV/c

Particles studied bottom, charm

Brief description An experimental search for beauty particles produced in fixed target hadronic interactions. Uses a high precision Decay Detector and a fast secondary vertex trigger processor. Data analysis in progress (July 96).

Journal papers NIM A315 (1992) 95, NP (PROC SUPPL) 27 (1992) 251, NIM A337 (1994) 225, NIM A351 (1994) 222, NIM A351 (1994) 225, NIM A361 (1995) 506, NIM A368 (1995) 185, NP (PROC SUPPL) 44 (1995) 435, PL B348 (1995) 256, and PL B353 (1995) 563.

Related experiments FNAL-653, FNAL-771

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CERN-WA-094

(Proposed Jan 1991, Approved Apr 1991, Began data-taking Oct 1991, Completed data-taking Nov 1993)

STUDY OF BARYON AND ANTIBARYON SPECTRA IN SULPHUR–SULPHUR INTERACTIONS AT 200 GeV/c PER NUCLEON

WA94 COLLABORATION

ATHENS U – S Abatzis, G Vassiliadis
BARI U – D Di Bari, D Elia, R Fini, B Ghidini, A Jacholkowski, V Lenti, R A Loconsole, V Manzari, F Navach
BERGEN U – E Andersen, K Fanebust, H Helstrup, G Lovhoiden, P Sennels, T F Thorsteinsen
BIRMINGHAM U – J N Carney, J P Davies, D Evans, J B Kinson (√ Spokesperson), A Kirk, K Norman, M Venables, O Villalobos-Baillie, M F Votruba
COMENIUS U – J Ftacnik, R Lietava
CERN – F Antinori, W Beusch, B R French, A K Holme, K Knudson, J C Lassalle, M Passaseo, E Quercigh, K Safarik
KOSICE, IEF – J Boehm, I Kralik, K Piska, L Sandor, J Urban, P Zavada
LEGNARO – R A Ricci
MADRID, CIEMAT – B de la Cruz, P Ladron de Guevara
PADUA U & INFN, PADUA – A Andrighetto, N Carrer, M Morando, F Pellegrini, G Segato

COLLEGE DE FRANCE – M Benayoun, J Kahane, P Leruste, J L Narjoux, M Sene, R Sene, A Volte
SERPUKHOV – V A Kachanov, A V Singovsky
STRASBOURG, CRN – T Kachelhoffer, M E Michalon-Mentzer, A Michalon
TRIESTE U & INFN, TRIESTE – A Bravar, A Penzo

Accelerator CERN-SPS *Detector* OMEGA

Reactions

Su Su	200 GeV (T_{lab}/N)
p Su	200 GeV (T_{lab})

Particles studied strange

Brief description Extends analysis of CERN-WA-085 from S W to S S interactions. For the 1992 run the apparatus has been modified to measure charged particle spectra (in particular p and $\bar{p}$) with particle identification using an array of silicon microstrip detectors and a newly upgraded ring imaging Čerenkov detector.

Journal papers NP A566 (1994) 499, PL B354 (1995) 178, NP A590 (1995) 317, and NIM A371 (1996) 22.

Related experiments CERN-WA-085, CERN-WA-097

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CERN-WA-095

(Proposed Dec 1990, Approved Sep 1991, Began data-taking May 1994, In progress)

A NEW SEARCH FOR $\nu_\mu \leftrightarrow \nu_\tau$ OSCILLATIONS

CHORUS COLLABORATION
CUKUROVA U – E Eskut, A Kayis, G Onengut
NIKHEF, AMSTERDAM – J Konijn, R G C Oldeman, J W E Uiterwijk, R van Dantzig, C A F J van der Poel
MIDDLE EAST TECH U, ANKARA – A S Ayan, E Pesen, M Serin-Zeyrek, R Sever, P Tolun, M T Zeyrek
BARI U – N Armenise, F Cassol, M G Catanesi, M T Muciaccia, E Radicioni, S Simone
HUMBOLDT U, BERLIN – P Lendermann, A Meyer-Sievers, T Patzak, K Winter (√ Spokesperson)
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FERRARA U & INFN, FERRARA – E Di Capua, C Luppi, S Ricciardi, B Saitta
TOHO U – T Kawamura, M Kazuno, S Ogawa, H Shibuya
CERN – R Beyer, J Brunner, M de Jong, J P Fabre, R Ferreira, W Flegel, R Gurin, M Litmaath, L Ludovici, D Macina, R Meijer Drees, H Meinhard, E Niu, H Overas, J Panman, F Riccardi, A Rozanov, D Saltzberg, G Stefanini, R Tzenov, C Weinheimer, H Wong, P Zucchelli
HAIFA U – J Goldberg, K Hopfner
KINKI U – H Chikawa
BOGAZICI U – E Arik, I Birol, A A Mailov
GYEONGSANG NATIONAL U – C H Hahn, H I Jang, D C Kim, I G Park, M S Park, J S Song, C S Yoon
AICHI U OF EDUCATION – K Kodama, N Ushida
KOBE U – S Aoki, T Hara
LOUVAIN U – G Brooijmans, D Favart, G Gregoire, J Herin, V Lemaitre
MOSCOW, ITEP – A Artamonov, P Gorbunov, V Khovansky, V Shamanov, V Smirnitsky
MUNSTER U – D Bonekamper, D Frekers, D Rondeshagen, T Wolff
NAGOYA U – K Hoshino, M Kobayashi, Y Kotaka, T Kozaki, M Nakamura, T Nakano, K Niu, K Niwa, Y Obayashi, O Sato, T Toshito
NAPLES U, IFS & INFN, NAPLES – S Buontempo, A Cocco, A Ereditato, G Fiorillo, F Garufi, F Marchetti-Stasi, P Migliozzi, V Palladino, P Strolin
OSAKA CITY U – K Nakamura, T Okusawa, T Yoshida
ROME U & INFN, ROME – A Capone, D De Pedis, S Di Liberto, U Dore, P F Loverre, A Maslennikov, M A Mazzoni, F Meddi, G Piredda, P Righini, R Santacesaria
SALERNO U & INFN, SALERNO – A di Bartolomeo, G Grella, G Romano, G Rosa
UTSUNOMIYA U – Y Sato, I Tezuka

Accelerator CERN-SPS *Detector* Spectrometer, Calorimeter

Reactions

ν_τ nucleon $\rightarrow \tau^-$ X	25 GeV (E_{lab})

Brief description The setup consists of a target region, an aircore magnet, a high-precision calorimeter, and a muon spectrometer. Nuclear emulsion stacks form the 800-kg mass of the fiducial target volume. Decays of short-lived particles, such as the τ, are visualized with high efficiency. Tracks are located in the emulsion with high-precision scintillating fiber trackers, and readout with optoelectronic image intensifiers coupled to CCD cameras, thus permitting computer-assisted scanning. The hexagonal aircore magnet provides the measurement of the charge-sign of low energy hadrons and muons. The high-precision calorimeter, which is based on spaghetti technology, tags the τ^- decay by its transverse momentum imbalance. The spectrometer identifies muons and measures their momentum and charge. A second phase of data taking with new emulsion stacks is under way (July 96).

Journal papers NIM A344 (1994) 143, NIM A349 (1994) 70, IJMP C5 (1994) 835, NIM A357 (1995) 243, and NIM A367 (1995) 367.

Related experiments CERN-WA-096, FNAL-803

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WWW Home-page http://choruswww.cern.ch/welcome.html

CERN-WA-096

(Proposed 1991, Approved 1991, Began data-taking Apr 1994)

SEARCH FOR THE OSCILLATION $\nu_\mu \leftrightarrow \nu_\tau$

NOMAD COLLABORATION
ANNECY – G Bassompierre, J M Gaillard, M Gouanere, J P Mendiburu, L Mossuz, H Pessard, D Sillou, D Verkindt
CERN – D Autiero, L Camilleri, L Di Lella (√ Spokesperson), D Ferrere, A Geiser, J J Gomez-Cadenas, A Grant, W Huta, L Linssen, P Nedelec, A Placci, B Pope, C Roda, A Rubbia, P Steffen, E Tsesmelis, F Wilson
CALABRIA U – L La Rotonda, M Valdata
DORTMUND U – D Geppert, C Goessling, D Nordmann, D Pollmann, B Schmidt, T Weisse, K Zuber
DUBNA – S Bunyatov, O Klimov, Y Nefedov, B Popov, S Tereshchenko, S Valuev
FLORENCE U & INFN, FLORENCE – G Conforto, G Graziani, E Iacopini, M Kirsanov, A Lupi, A Marchionni, F Martelli, E Pennacchio, C Ricci, M Veltri
HARVARD U – A Bueno, T Dignan, G Feldman, P Hurst, S Mishra
JOHNS HOPKINS U – B Blumenfeld, J Long, D M Steele
LAUSANNE U – K Benslama, I Bird, H Degaudenzi, C Joseph, M C Nguyen, J P Perroud, G Sozzi, M Steininger, M T Tran, J M Vieira, M Werlen
MELBOURNE U – N Hyett, G Moorhead, C Poulsen, M Sevior, G Taylor, S Tovey, L Winton
MOSCOW, INR – S Gninenko, A Kovzelev, A Toropin, S Volkov
PADUA U & INFN, PADUA – M Baldo-Ceolin, F Bobisut, G Collazuol, M Contalbrigo, D Gibin, A Guglielmi, S Lacaprara, M Laveder, M Mezzetto, G Miari, A Sconza, M Vascon, P Zuccon
PARIS, CURIE UNIV VI & PARIS, UNIV VII, LPNHE – P Astier, M Banner, J Dumarchez, E Gangler, A Letessier-Selvon, J-M Levy, K Schamaneche, A M Touchard, F Vannucci
PAVIA U & INFN, PAVIA – P Cattaneo, C Conta, R Ferrari, M Fraternali, A Lanza, M Livan, D Orestano, F Pastore, R Petti, G Polesello, A Rimoldi, F Salvatore, V Vercesi
PISA U & INFN, PISA – C Angelini, V Cavasinni, T Del Prete, A De Santo, V Flaminio, C Lazzeroni, G Renzoni
DAPNIA, SACLAY – A Baldisseri, J Bouchez, J Gosset, C Hagner, X Mechain, J P Meyer, A Pluquet, P Rathouit, T Stolarczyk, M Vo, H Zaccone
SYDNEY, ANSTO – I J Donnelly, K Varvell
SYDNEY U – S Boyd, L Peak, P Soler, J Ulrichs, B Yabsley
UCLA – A Cardini, R Cousins, T Vinogradova, F Weber
MASSACHUSETTS U, AMHERST – J D Hernando
BOŠKOVIĆ INST, ZAGREB – D Kekez, A Ljubičić, M Stipčević

Accelerator CERN-SPS *Detector* Spectrometer

Reactions

p nucleon $\rightarrow \nu$ X	450 GeV/c
ν_τ nucleon $\rightarrow \tau$ X	—

Particles studied ν

Brief description Searches for the oscillation $\nu_\mu \leftrightarrow \nu_\tau$ in a wide band, 10–200 GeV neutrino beam. Aims at detecting ν_τ charged-current interactions by observing the production of the τ through its various decay modes by means of kinematical criteria. The detector reconstructs the event kinematics. It uses the CERN-UA-001 magnet. The target consists of 44 drift chamber planes with a total mass of 2.9 tons over a fiducial volume of 2.6 × 2.6 × 4 m^3. It is followed by transition radiation detectors, by additional tracking chambers and by an electromagnetic calorimeter consisting of 875 lead glass blocks and including a preshower detector. A hadronic calorimeter made of iron and scintillator is located behind the electromagnetic calorimeter outside of the magnetic field volume. A muon detector has two stations of large-area drift-tube chambers on both sides of an iron absorber. The sensitivity of the detector to $(\Delta m)^2$ is larger than 1 eV^2. Taking data (July 96). Expected to continue data taking until the end of 1997.

Journal papers NIM A372 (1996) 556, and NIM A373 (1996) 358.

Related experiments CERN-WA-095, FNAL-803

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CERN-WA-102

(Proposed Sep 1994, Approved Sep 1994, Began data-taking Apr 1995, In progress)

A SEARCH FOR CENTRALLY PRODUCED NON-$q\bar{q}$ MESONS IN PROTON PROTON INTERACTIONS AT 450 GeV/c USING THE Ω SPECTROMETER AND GAMS-4000

WA102 COLLABORATION

ANNECY – J P Peigneux, M Poulet
ATHENS U – M Spyropoulou-Stassinaki, G Vassiliadis
BERGEN U – K Myklebost, J M Olsen
BIRMINGHAM U – J N Carney, J P Davies, D Evans, J B Kinson, K Norman, M Venables, O Villalobos Baillie, M F Votruba
BRUSSELS U, IISN – F G Binon, J M Frere, J P Stroot
CERN – W Beusch, B R French, A Jacholkowski, A Kirk (√ Spokesperson), W Klempt, P Martinengo, E Quercigh, H Rotscheidt, M Sene, R Sene
DUBNA – Y Kulchitsky, S Maljukov, I Minashvili, V Romanovsky, V Roumiantsev, N Russakovich, A Semenov, A Soloviev, G Tchlatchidze
KEK – S Inaba, T Ishida, T Kinashi, T Nakagawa, H Shimizu, K Takamatsu, T Tsuru, Y Yasu
UNIVERSITY COLL, LONDON – G Crone, M Esten
LOS ALAMOS – D Alde, E A Knapp, T Lopez
MANCHESTER U – I Duerdoth, N Lumb, S Snow, R Thompson
OSLO U – K Danielsen, T Jacobsen
SERPUKHOV – A V Dolgopolov, S V Donskov, A V Inyakin, G V Khaustov, V Kolossov, A A Kondashov, A A Lednev, V A Polovnikov, S A Polyakov, Y D Prokoshkin, S A Sadovsky, V D Samoylenko, P M Shagin, A V Shtannikov, A V Singovsky, V P Sugonyaev

Accelerator CERN-SPS *Detector* OMEGA, GAMS-4000

Reactions

$p\ p \rightarrow p\ p$ X	450 GeV/c (P_{lab})

Particles studied mesons

Brief description Proposes to perform two 100 day runs combining the multiphoton detection of GAMS-4000 with the charged particle detection of the Omega Spectrometer to search for non-$q\bar{q}$ mesons in the reaction $pp \rightarrow p_f X^0 p_s$ at 450 GeV/c. Here, p_f and p_s stand for the fastest and the slowest particles in the lab system. Particular attention will be paid to the final states decaying to $\eta\eta, \eta\eta'$ and $\eta'\eta'$. The physics goal is a better understanding of non-perturbative QCD. Taking data (July 96).

Related experiments CERN-WA-076, CERN-WA-091

E-mail contact andrew.kirk@cern.ch

CERN-LHC-ATLAS

(Proposed Oct 1992, Dec 1994, Approved Jan 1996, In preparation)

A TOROIDAL LHC APPARATUS - ATLAS

ATLAS COLLABORATION

Accelerator CERN-LHC *Detector* ATLAS

Brief description ATLAS is a general purpose experiment for recording the proton–proton collisions at LHC. The detector design has been optimized to cover searches for Higgs bosons, alternative schemes of the symmetry breaking, searches for supersymmetric particles and other new particles, study of compositeness of quarks and leptons, CP violation in the B sector, measurements of the properties of the third family of quarks, and more. The apparatus includes an inner tracking detector inside a 2-tesla solenoid, electromagnetic and hadronic calorimeters outside the solenoid and in the forward regions, and barrel and endcap air-core-toroid muon spectrometers. Under construction (July 96). The collaboration consists of more than 1500 scientists, engineers, and graduate students from 148 participating institutions. For further details, please contact the Spokesperson, Dr. Peter Jenni [CERN], or the Deputy Spokesperson, Dr. Torsten Akesson [Lund U.]

E-mail contact peter.jenni@cern.ch, torsten.akesson@quark.lu.se

WWW Home-page http://atlasinfo.cern.ch/Atlas/Welcome.html

CERN-LHC-CMS

(Proposed Oct 1992, Approved Jan 1996, In preparation)

THE COMPACT MUON SOLENOID - CMS

CMS COLLABORATION

Accelerator CERN-LHC *Detector* CMS

Brief description CMS is a general purpose detector designed to run at the highest luminosity at the LHC. It has been optimized for the search of the Standard Model Higgs boson over a mass range from 90 GeV to 1 TeV, but it also allows detection of a wide range of possible signatures from alternative electroweak symmetry breaking mechanisms. Furthermore, it is well adapted for the study of top, beauty and tau physics at lower luminosities and will cover several important aspects of the heavy ion physics program. CMS identifies and measures muons, photons and electrons with high precision. At the core of the detector sits a large superconducting solenoid generating a uniform magnetic field of 4 T. The strong magnetic field allows a compact design for the muon spectrometer without compromising the momentum resolution. The central tracker consists of silicon pixels, silicon microstrips and microstrip gas chambers. The electromagnetic calorimeter is based on Lead Tungstate crystals. Under construction (July 96). The collaboration consists of almost 1500 scientists, engineers, and graduate students from 134 participating institutions in 30 countries. For further details, please contact the Spokesperson, Dr. Michel della Negra [CERN], or the Deputy Spokesperson, Dr. Tejinder S. Virdee [Imperial Coll.]

E-mail contact michel.della.negra@cern.ch, tejinder.virdee@cern.ch

WWW Home-page
http://cmsinfo.cern.ch/cmsinfo/Welcome.html

Other CERN Experiments

Listed here are some other CERN experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. Check also the annual report 'Experiments at CERN', which lists all the current CERN experiments and R&D projects. Find additional information at the Web site: http://www.cern.ch/CERN/Experiments.html

CERN-EMU-011 (Taking data)

STUDY OF PARTICLE PRODUCTION AND NUCLEAR FRAGMENTATION IN RELATIVISTIC HEAVY ION COLLISIONS IN NUCLEAR EMULSION

Spokesperson: P.L. Jain [SUNY, Buffalo]

E-mail contact phyjain@ubvms.cc.buffalo.edu

CERN-EMU-012 (Taking data)

PARTICLE PRODUCTION, DENSITY FLUCTUATIONS, AND BREAK UP OF DENSE NUCLEAR MATTER IN CENTRAL Pb Ag AND Pb Pb INTERACTIONS AT 60–160 A GeV

Spokesperson: I. Otterlund [Lund U.]

E-mail contact ingvar.otterlund@kosufy.lu.se

CERN-EMU-013 (Completed data-taking)

INTERACTIONS OF 160 GeV/NUCLEON ^{207}Pb NUCLEI IN EMULSION CHAMBERS WITH COPPER AND LEAD TARGETS

By KLMM Collaboration

Spokesperson: W. Wolter [Cracow, INP-Exp]

E-mail contact wwolter@vsk01.ifj.edu.pl

CERN-EMU-014 (Taking data)

STUDY OF MULTIPLICITY AND ANGULAR CHARACTERISTICS IN Pb + A INTERACTION AT 200 A GeV/c

Spokesperson: D. Ghosh [Jadavpur U.]

CERN-EMU-015 (Taking data)

INVESTIGATION OF CENTRAL Pb Pb INTERACTIONS AT ENERGIES OF 160 GeV/NUCLEON WITH THE HELP OF THE EMULSION MAGNETIC CHAMBER

Spokesperson: K.A. Kotelnikov [Lebedev Inst.]

E-mail contact koteln@sci.fian.msk.su

CERN-EMU-016 (Taking data)

ISOSPIN CORRELATIONS IN HIGH ENERGY Pb Pb INTERACTIONS

Spokesperson: Y. Takahashi [Alabama U., Huntsville]

E-mail contact takahashi@ssl.msfc.nasa.gov

CERN-EMU-017 (Completed data-taking Dec 1994)

FRAGMENTATION OF Pb PROJECTILES AT SPS ENERGIES

Spokesperson: Wolfgang Heinrich [Siegen U.]

E-mail contact heinrich@hrz.uni-siegen.d400.de

CERN-EMU-018 (Taking data)

EXPOSURES OF CR39 STACKS TO LEAD IONS AT THE CERN-SPS

Spokesperson: G. Giacomelli [Bologna U. and INFN, Bologna]

E-mail contact giacomelli@bologna.infn.it

CERN-EMU-019 (Taking data)

NUCLEAR FRAGMENTATION INDUCED BY RELATIVISTIC PROJECTILES STUDIED IN THE 4π CONFIGURATION OF PLASTIC TRACK DETECTORS

Spokesperson: H.A. Khan [Pinstech, Islamabad]

CERN-EMU-020 (Taking data)

$\bar{p}$-INDUCED FISSION STUDIES WITH PLASTIC TRACK DETECTORS USING 4π GEOMETRY

Spokesperson: H.A. Khan [Pinstech, Islamabad]

CERN-NA-035 (Completed data-taking May 1992)

STUDY OF RELATIVISTIC NUCLEUS–NUCLEUS COLLISIONS

By NA35 Collaboration

Spokesperson: Peter Seyboth [Munich, Max Planck Inst.]

E-mail contact pxs@dmumpiwh.mppmu.mpg.de

WWW Home-page http://hpna49-1.cern.ch/na35.html

CERN-NA-038 (Completed data-taking May 1992)

STUDY OF HIGH-ENERGY NUCLEUS–NUCLEUS INTERACTIONS WITH THE ENLARGED NA10 DIMUON SPECTROMETER

Spokesperson: Louis Kluberg [Ecole Polytechnique, LPNHE]

E-mail contact louis.kluberg@cern.ch

WWW Home-page http://www.cern.ch/NA38/

CERN-NA-043-2 (Taking data)

INVESTIGATIONS OF THE COHERENT HARD PHOTON YIELDS FROM 50–300 GeV/c $e^{\pm}$ IN STRONG CRYSTALLINE FIELDS OF DIAMOND, Si, AND Ge CRYSTALS

Spokesperson: Erik Uggerhoj [Aarhus U.]

E-mail contact isa@dfi.aau.dk

CERN-NA-044 (Taking data)

A FOCUSSING SPECTROMETER FOR ONE AND TWO PARTICLES

Spokesperson: Hans Boggild [Bohr Inst.]

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WWW Home-page http://p2hp2.lanl.gov/na44/na44.html

CERN-NA-045 (Completed data-taking Apr 1995)

STUDY OF LOW-MASS ELECTRON PAIR PRODUCTION IN HADRON AND NUCLEAR COLLISIONS AT THE CERN SPS

By CERES Collaboration

Spokesperson: Itzhak Tserruya [Weizmann Inst.]

E-mail contact fntsruya@weizmann.weizmann.ac.il, itzhak.tserruya@cern.ch

WWW Home-page http://ceres6.physi.uni-heidelberg.de/

CERN-NA-049 (Taking data)

LARGE ACCEPTANCE HADRON DETECTOR FOR AN INVESTIGATION OF Pb-INDUCED REACTIONS AT THE CERN SPS

Spokesperson: Reinhard Stock [Frankfurt U.]

E-mail contact stock@ikf.physik.uni-frankfurt.de, reinhard.stock@cern.ch

WWW Home-page http://hpna49-1.cern.ch/na49.html

CERN-NA-052 (Taking data)

STRANGELET AND PARTICLE SEARCH IN Pb Pb COLLISIONS

Spokesperson: Klaus Pretzl [Bern U.]

E-mail contact klaus.pretzl@cern.ch

WWW Home-page http://www.lhep.unibe.ch/newmass/

CERN-NA-053 (Taking data)

ELECTROMAGNETIC DISSOCIATION OF TARGET NUCLEI BY ^{208}Pb PROJECTILES

Spokesperson: J.C. Hill [Iowa State U.]

E-mail contact jhill@iastate.edu

CERN-NA-054 (Taking data)

DETERMINATION OF CROSS-SECTIONS OF FAST-MUON INDUCED REACTIONS TO COSMOGENIC RADIONUCLIDES

Spokesperson: E. Nolte [Munich, Tech U.]

CERN-NA-055 (In preparation)

INVESTIGATION OF FAST NEUTRON PRODUCTION BY 100 TO 250 GeV MUON INTERACTION ON THIN TARGETS

Spokesperson: N. Mascarenhas [Cal Tech]

CERN-NA-056 (In preparation)

MEASUREMENT OF PION AND KAON FLUXES BELOW 60 GeV/c PRODUCED BY 450 GeV/c PROTONS ON A BERYLLIUM TARGET

By SPY Collaboration

Spokesperson: S. Ragazzi [Milan U. and INFN, Milan]

WWW Home-page http://www.cern.ch/NA56/

CERN-PS-185-3 (In preparation)

A MEASUREMENT OF DEPOLARIZATION AND SPIN TRANSFER IN $\bar{p}p \to \bar{\Lambda}\Lambda$

Spokesperson:
Klaus Roehrich [Julich, Forschungszentrum] *WWW Home-page* http://hpfr02.physik.uni-freiburg.de/ps185/ps185.html

CERN-PS-189 (Completed data-taking Dec 1992)

HIGH PRECISION MASS MEASUREMENTS WITH A RADIOFREQUENCY MASS SPECTROMETER – APPLICATION TO THE MEASUREMENT OF THE $p\,\bar{p}$ MASS DIFFERENCE

Spokesperson: Catherine Thibault [Orsay, CSNSM]

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CERN-PS-194-3 (Taking data)

MEASUREMENT OF STOPPING POWERS AND SINGLE IONIZATION CROSS-SECTIONS FOR ANTIPROTONS AT LOW ENERGIES

Spokesperson: Erik Uggerhoj [Aarhus U.]

CERN-PS-200 (Taking data)

CAPTURE, ELECTRON COOLING, AND COMPRESSION OF ANTIPROTONS IN A LARGE PENNING TRAP AND PHYSICS EXPERIMENTS WITH AN ULTRA-LOW-ENERGY EXTRACTED ANTIPROTON BEAM

Spokespersons: M.H. Holzscheiter, M.M. Nieto [Los Alamos]

E-mail contact mhh@lanl.gov

CERN-PS-203 (Completed data-taking Dec 1993)

ANTIPROTON INDUCED FISSION AND FRAGMENTATION OF NUCLEI

Spokesperson: T. von Egidy [Munich, Tech. U.]

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CERN-PS-205 (Taking data)

LASER SPECTROSCOPY OF ANTIPROTONIC HELIUM ATOMS

By PS205 Collaboration

Spokesperson: T. Yamazaki [Tokyo U., INS]

E-mail contact yamazaki@insie1.ins.u-tokyo.ac.jp, eades@vxcern.cern.ch

WWW Home-page http://www.cern.ch/LEAR_PS205/

CERN-PS-206 (Completed data-taking Sep 1993)

MEASUREMENT OF THE $\bar{p}p \to \bar{n}n$ CHARGE-EXCHANGE DIFFERENTIAL CROSS SECTION

By CCX Collaboration

Spokesperson: Franco Bradamante [Trieste U. and INFN, Trieste]

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CERN-PS-207 (Taking data)

PRECISION MEASUREMENT OF THE ENERGIES AND LINE SHAPES OF ANTIPROTONIC LYMAN AND BALMER TRANSITIONS FROM HYDROGEN AND HELIUM ISOTOPES

Spokesperson: D. Gotta [Julich, Forschungszentrum]

CERN-PS-209 (Taking data)

NEUTRON HALO AND ANTIPROTON–NUCLEUS POTENTIAL FROM ANTIPROTONIC X-RAYS

Spokesperson: J. Jastrzebski [Warsaw U., Heavy Ion Lab]

CERN-PS-210 (Taking data)

ANTIHYDROGEN PRODUCTION IN $\bar{p}$ Z INTERACTION

Spokesperson: W. Oelert [Julich, Forschungszentrum]

E-mail contact w.oelert@kfa-juelich.de

WWW Home-page http://ikpe1101.ikp.kfa-juelich.de/ps210/

CERN-PS-211 (In preparation)

EXPERIMENTAL STUDY OF THE PHENOMENOLOGY OF SPALLATION NEUTRONS IN A LARGE LEAD BLOCK

Spokesperson: C. Rubbia [CERN]

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CERN-PS-212 (In preparation)

LIFETIME MEASUREMENT OF $\pi^+\pi^-$ ATOMS TO TEST LOW-ENERGY QCD PREDICTIONS

Spokesperson: L. Nemenov [Dubna, JINR]

E-mail contact nemenov@nu.jinr.dubna.su

CERN-WA-084 (Completed data-taking Sep 1991)

STUDY OF THE PRODUCTION AND DECAY PROPERTIES OF BEAUTY FLAVORED HADRONS

Spokesperson: Giuseppe Martellotti [Rome U. and INFN, Rome]

E-mail contact martellotti@roma1.infn.it

CERN-WA-097 (Taking data)

STUDY OF BARYON AND ANTIBARYON SPECTRA IN Pb Pb INTERACTIONS AT 160 GeV/c PER NUCLEON

Spokesperson: Emanuele Quercigh [CERN]

E-mail contact emanuele.quercigh@cern.ch

CERN-WA-098 (Taking data)

LARGE ACCEPTANCE MEASUREMENT OF PHOTONS AND CHARGED PARTICLES IN HEAVY ION REACTIONS

Spokesperson: Hans H. Gutbrod [Darmstadt, GSI]

E-mail contact gutbrod@vxwa80.cern.ch

WWW Home-page http://www.cern.ch/WA98/Welcome.html

CERN-WA-099 (Completed data-taking Apr 1995)

MEASUREMENTS OF PAIR PRODUCTION AND ELECTRON CAPTURE FROM THE CONTINUUM IN HEAVY PARTICLE COLLISIONS

Spokesperson: S. Datz [Oak Ridge]

E-mail contact datzs@ornl.gov

CERN-WA-099-2 (Taking data)

CHARGE CHANGING COLLISIONS, ENERGY LOSS, AND EM NUCLEAR REACTIONS OF 160 GeV A ^{208}Pb

Spokesperson: S. Datz [Oak Ridge]

E-mail contact datzs@ornl.gov

CERN-WA-101 (Taking data)

STUDY OF VARIOUS PROCESSES WITH A 160 GeV/c PER NUCLEON Pb BEAM

Spokesperson: Yudong He [UC, Berkeley]

E-mail contact yudong@physics.berkeley.edu

CERN Future Plans

CERN's main project for the start of the next millennium is the LHC proton–proton collider in the 27-kilometer LEP tunnel, currently scheduled to begin experiments in 2005. Besides the LHC, the ongoing program also continues CERN's tradition of serving a wide research community. The LEP electron–positron collider, after six years of running at and around the Z resonance, has been equipped with superconducting accelerating cavities, thereby becoming LEP2, and began operating in Summer 1996 at a collision energy of 161 GeV, the threshold to produce pairs of W bosons. The collision energy of LEP2 is being further increased as additional superconducting cavities are added. The collider is scheduled to operate till the end of 1999. At the SPS proton synchrotron, flagship experiments continue with neutrino and muon beams and in the study of CP violation. In addition, the heavy ion program at the SPS serves a large range of experiments for a separate research community. While the LEAR low energy antiproton ring is being closed in 1996, a new facility is being foreseen to supply a modest level of antiprotons for experiments on 'trapped' antiparticles. The ISOLDE on-line isotope separator, served by the 1 GeV Booster synchrotron, caters to yet another group of researchers.

CESR Experiments

CESR-CLEO

(Proposed 1975, Approved 1977, Began data-taking Oct 1979, In progress)

THE CLEO EXPERIMENT AT CESR

CLEO COLLABORATION

CAL TECH – B Barish, M Chadha, S Chan, G Eigen, J S Miller, C O'Grady, M Schmidtler, J Urheim, A J Weinstein, F Wuerthwein

CARLETON U – K W Edwards

COLORADO U – R Balest, B H Behrens, K Cho, W T Ford, H Park, P Rankin, J Roy, J G Smith

CORNELL U – J P Alexander, C Bebek, B E Berger, K Berkelman, K Bloom, D G Cassel, H A Cho, D M Coffman, D S Crowcroft, M Dickson, P S Drell, K M Ecklund, R Ehrlich, R Elia, A Foland, P Gaidarev, R S Galik, B Gittelman, S W Gray, D L Hartill, B K Heltsley, P Hopman, S L Jones, J Kandaswamy, P C Kim, D L Kreinick, T Lee, Y Liu, G S Ludwig, J Masui, J Mevissen, N B Mistry, C R Ng, E Nordberg, M Ogg, J R Patterson, D Peterson, D Riley, A Soffer, B Valant-Spaight, C Ward

FLORIDA U – M Athanas, P Avery, C D Jones, M Lohner, C Prescott, J Yelton

HARVARD U – G Brandenburg, R A Briere, Y Gao, D Kim, R Wilson, H Yamamoto

HAWAII U – T E Browder, F Li, Y Li, J Rodriguez

ILLINOIS U, URBANA – T Bergfeld, B I Eisenstein, J Ernst, G E Gladding, G D Gollin, R M Hans, E Johnson, M Marsh, M Palmer, M Selen, J J Thaler

MCGILL U – A Bellerive, D I Britton, R Janicek, D B MacFarlane, K W McLean, P M Patel

ITHACA COLL – A J Sadoff

KANSAS U – R Ammar, P Baringer, A Bean, D Besson, D Coppage, C Darling, R Davis, N Hancock, S Kotov, I Kravchenko, N Kwak

MINNESOTA U – S Anderson, Y Kubota, M Lattery, S Lee, J J O'Neill, S Patton, R A Poling (√ Spokesperson), T Riehle, V Savinov, A Smith

SUNY, ALBANY – M S Alam, B Athar, Z Ling, A H Mahmood, H Severini, S Timm, F Wappler

OHIO STATE U – A Anastassov, J E Duboscq, D Fujino, K K Gan, T Hart, K Honscheid, H Kagan, R Kass, J Lee, M Spencer, M Sung, A Undrus, A Wolf, M M Zoeller

OKLAHOMA U – B Nemati, S J Richichi, W R Ross, P Skubic, M Wood

PURDUE U – M Bishai, J Fast, E Gerndt, J W Hinson, N Menon, D H Miller, E I Shibata, I P J Shipsey, M Yurko

ROCHESTER U – L Gibbons, S D Johnson, Y Kwon, S Roberts, E H Thorndike, L Tian

SLAC – C P Jessop, K Lingel, H Marsiske, M L Perl, S F Schaffner, R Schindler, D Ugolini, R Wang, X Xhou

SOUTHERN METHODIST U – T E Coan, V Fadeyev, I Korolkov, Y Maravin, I Narsky, V Shelkov, J Staeck, R Stroynowski, I Volobuev, J Ye

SYRACUSE U – M Artuso, A Efimov, F Frasconi, M Gao, M Goldberg, R Greene, D He, N Horwitz, S Kopp, G C Moneti, R Mountain, Y Mukhin, S Schuh, T Skwarnicki, S Stone, G Viehauser, X Xing

UC, SAN DIEGO – D M Asner, D W Bliss, W S Brower, G Masek, H P Paar, V Sharma, M Sivertz

UC, SANTA BARBARA – J Gronberg, R Kutschke, D J Lange, S Menary, R J Morrison, H N Nelson, T K Nelson, C Qiao, J D Richman, D Roberts, A Ryd, M S Witherell, A Wu

VANDERBILT U – J Bartelt, S E Csorna, V Jain, S Marka

VIRGINIA TECH – R Godang, K Kinoshita, I C Lai, P Pomianowski, S Schrenk

WAYNE STATE U – G Bonvicini, D Cinabro, L Perera, G Sun, G J Zhou

Accelerator CESR *Detector* CLEO

Reactions

$e^+ e^- \to$ hadrons	9.0–12.0 GeV (Ecm)
$e^+ e^- \to e^+ e^-$	"
$e^+ e^- \to \mu^+ \mu^-$	"
$e^+ e^- \to e^+ e^-$ hadrons	"
$e^+ e^- \to \tau^+ \tau^-$	"

Particles studied $\Upsilon(1S)$, $\Upsilon(2S)$, $\Upsilon(3S)$, $\Upsilon(4S)$, B, τ, D^+, D^0, D_s^+, charmed-baryon

Brief description Since 1979 the collaboration has conducted studies of b, c, τ and $\gamma\gamma$ physics in e^+e^- interactions near 10 GeV. Current topics include determination of the CKM parameters and the Standard Model tests in decays of heavy flavors, as well as QCD tests in a variety of processes. Successive detector upgrades have kept pace with luminosity improvements to the Cornell Electron Storage Ring (CESR), which has delivered over 6 fb^{-1} of integrated luminosity to date. The CLEO-II detector (proposed 1983, approved 1984, operational since 1989) consists of drift chambers for tracking charged particles and measuring dE/dx, time-of-flight counters, a 7800-element CsI electromagnetic calorimeter, a 1.5 tesla superconducting solenoid, iron for flux return and muon identification, and muon chambers. A three-layer silicon vertex detector was added in the Fall of 1995. Taking data (July 96). A major upgrade, the CLEO-III detector, was proposed and approved in 1994, and the installation is planned for 1998.

Journal papers PRL 44 (1980) 1108, PRL 45 (1980) 219, PRL 46 (1981) 84, PRL 46 (1981) 88, PRL 46 (1981) 1181, PRL 48 (1982) 1070, PRL 49 (1982) 357, PRL 49 (1982) 610, PRL 49 (1982) 617, NIM 211 (1983) 47, PL B122 (1983) 317, PRL 50 (1983) 807, PRL 50 (1983) 877, PRL 50 (1983) 881, PRL 51 (1983) 347, PRL 51 (1983) 634, PRL 51 (1983) 1139, PRL 51 (1983) 1143, PR D27 (1983) 475, PR D27 (1983) 1665, PL B137 (1984) 277, PRL 52 (1984) 799, PRL 52 (1984) 1084, PRL 53 (1984) 24, PRL 53 (1984) 1309, PR D29 (1984) 1285, PR D30 (1984) 1433, PR D30 (1984) 1996, PR D30 (1984) 2279, PRL 54 (1985) 381, PRL 54 (1985) 1894, PRL 55 (1985) 923, PRL 55 (1985) 1248, PR D31 (1985) 2161, PR D31 (1985) 2386, PR D32 (1985) 2294, PR D32 (1985) 2468, PRL 56 (1986) 800, PRL 56 (1986) 1222, PRL 56 (1986) 1893, PRL 56 (1986) 2676, PRL 56 (1986) 2781, PR D33 (1986) 300, PR D34 (1986) 905, PR D34 (1986) 3279, PL B183 (1987) 429, PL B191 (1987) 318, PRL 58 (1987) 183, PRL 58 (1987) 307, PRL 58 (1987) 1814, PRL 59 (1987) 22, PRL 59 (1987) 407, PRL 59 (1987) 1993, PR D35 (1987) 19, PR D35 (1987) 1081, PR D35 (1987) 2747, PR D35 (1987) 3533, PR D36 (1987) 690, PR D36 (1987) 1289, PRL 60 (1988) 1614, PR D37 (1988) 1719 [erratum: PR D39 (1989) 1471], PR D38 (1988) 2679 [erratum: PR D40 (1989) 1701], PL B223 (1989) 470, PL B224 (1989) 445, PL B226 (1989) 192, PL B226 (1989) 401, PRL 62 (1989) 8, PRL 62 (1989) 863, PRL 62 (1989) 1240, PRL 62 (1989) 2233, PRL 62 (1989) 2436, PRL 63 (1989) 1667, PR D39 (1989) 3528, PR D40 (1989) 263, PR D40 (1989) 712 [erratum: PR D40 (1989) 3790], PL B243 (1990) 169, PL B251 (1990) 223, PRL 64 (1990) 16, PRL 64 (1990) 2117, PRL 64 (1990) 2226, PRL 65 (1990) 1184, PRL 65 (1990) 1531, PRL 65 (1990) 2842, PR D41 (1990) 805, PR D41 (1990) 774, PR D41 (1990) 1401, NIM A302 (1991) 261, PRL 67 (1991) 1692, PRL 67 (1991) 1696, PR D43 (1991) 651, PR D43 (1991) 1448, PR D43 (1991) 2836, PR D43 (1991) 3599, PR D44 (1991) 593, PR D44 (1991) 3383, PR D44 (1991) 3394, NIM A320 (1992) 66, PL B283 (1992) 161, PL B291 (1992) 488, PL B294 (1992) 139, PRL 68 (1992) 1275, PRL 68 (1992) 1279, PRL 69 (1992) 2041, PRL 69 (1992) 2046, PRL 69 (1992) 3278, PRL 69 (1992) 3610 [erratum: PRL 71 (1993) 3395], PR D45 (1992) 1, PR D45 (1992) 21, PR D45 (1992) 752, PR D45 (1992) 2212, PR D45 (1992) 3965, PR D45 (1992) 3976, PR D46 (1992) 4822, MPL A8 (1993) 869, PL B303 (1993) 377, PL B317 (1993) 647, PL B319 (1993) 365, PRL 70 (1993) 138, PRL 70 (1993) 1207, PRL 70 (1993) 2681, PRL 70 (1993) 3700, PRL 71 (1993) 674, PRL 71 (1993) 1311, PRL 71 (1993) 1680, PRL 71 (1993) 1791, PRL 71 (1993) 1973, PRL 71 (1993) 2391, PRL 71 (1993) 3070, PRL 71 (1993) 3255, PRL 71 (1993) 3259, PRL 71 (1993) 3922, PRL 71 (1993) 4111, PR D47 (1993) 791, PR D47 (1993) 3671, PR D48 (1993) 4007, NIM A345 (1994) 429, NIM A351 (1994) 19, NIM A351 (1994) 43, PL B323 (1994) 219, PL B324 (1994) 255, PL B325 (1994) 257, PL B331 (1994) 236 [erratum: PL B342 (1995) 453], PL B337 (1994) 405, PL B340 (1994) 129, PL B340 (1994) 194, PRL 72 (1994) 1406, PRL 72 (1994)

1972, PRL 72 (1994) 2328, PRL 72 (1994) 3762, PRL 73 (1994) 934, PRL 73 (1994) 1079, PRL 73 (1994) 1472, PRL 73 (1994) 1890, PRL 73 (1994) 3503 [erratum: PRL 74 (1995) 3090], PR D49 (1994) 40, PR D49 (1994) 5690, PR D49 (1994) 5701, PR D50 (1994) 43, PR D50 (1994) 1884, PR D50 (1994) 3027, PR D50 (1994) 4265, PR D50 (1994) 5484, NIM A368 (1995) 68, PL B341 (1995) 435 [erratum: PL B347 (1995) 469], PL B350 (1995) 256, PL B356 (1995) 580, PRL 74 (1995) 2885, PRL 74 (1995) 3113 [erratum: PRL 75 (1995) 4155], PRL 74 (1995) 3331, PRL 74 (1995) 3534, PRL 75 (1995) 624, PRL 75 (1995) 785, PRL 75 (1995) 3232, PRL 75 (1995) 3804, PRL 75 (1995) 3809, PRL 75 (1995) 4364, PR D51 (1995) 1014, PR D51 (1995) 2053, PR D52 (1995) 2656, PR D52 (1995) 2661, PR D52 (1995) 4860, PL B365 (1996) 431, PL B369 (1996) 186, PL B373 (1996) 261, PL B373 (1996) 334, PRL 76 (1996) 1570, PRL 76 (1996) 2637, PRL 76 (1996) 3065, PRL 76 (1996) 3898, PRL 76 (1996) 4119, PR D53 (1996) 1013, PR D53 (1996) 1039, PR D53 (1996) 4734, PR D53 (1996) 6033, and PR D53 (1996) 6037.

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WWW Home-page http://w4.lns.cornell.edu/

CESR Future Plans

The Cornell Electron Storage Ring (CESR) is currently delivering peak luminosities of 4×10^{32} $cm^{-2}s^{-1}$. In 1998, operations will shut down for detector and machine upgrades that will enable the machine to deliver peak luminosities in excess of 1.5×10^{33} $cm^{-2}s^{-1}$. The detector modifications will include new tracking devices and a high performance fast RICH detector with π/K separation out to the kinematic limit for B meson daughters. When CESR starts running again in late 1998, the physics focus of the upgrade will be rare B decays and CP violation. R&D is currently underway to further increase the luminosity of the storage ring to 10^{34} $cm^{-2}s^{-1}$, and the CESR/CLEO plans promise a rich physics program well into the next century.

DESY Experiments

DESY-DORIS-ARGUS

(Proposed 1978, Approved 1979, Began data-taking Sep 1982, Completed data-taking Oct 1992)

ARGUS — A NEW DETECTOR FOR DORIS

ARGUS COLLABORATION

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STEFAN INST, LJUBLJANA & LJUBLJANA U – M Bracko, G Kernel, P Krizan, E Kriznic, G Medin, T Podobnik, T Zivko
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Accelerator DESY-DORIS-III *Detector* ARGUS

Reactions

$e^+ e^-$	9.3–10.6 GeV (E_{cm})
$e^+ e^- \rightarrow$ charm X	"
$e^+ e^- \rightarrow$ bottom X	"
$e^+ e^- \rightarrow \Upsilon$(unspec)	"
$e^+ e^- \rightarrow$ hvy-lepton X	"
$e^+ e^- \rightarrow e^+ e^- \gamma \gamma$	"

Particles studied charm, bottom, Υ(unspec), hvy-lepton, ν_τ

Brief description Studies b- and c-quark physics, the τ lepton and its neutrino, Υ spectroscopy, two-photon physics, fragmentation of quarks and gluons, and searches for new particles. The detector consists of a silicon strip detector and a microvertex drift chamber surrounding the beam pipe, a tracking chamber, shower and TOF counters, solenoid coils, and a large iron yoke. Upgraded in 1990/91. Data analysis in progress (July 96).

Journal papers NIM 163 (1979) 77, NIM 195 (1982) 475, NIM 205 (1983) 125, NIM 216 (1983) 35, NIM 217 (1983) 153, PL B134 (1984) 137, PL B135 (1984) 498, PL B146 (1984) 111, NIM A235 (1985) 26, NIM A237 (1985) 464, PL B150 (1985) 235, PL B153 (1985) 343, PL B154 (1985) 452, PL B156 (1985) 134, ZPHY C28 (1985) 45, PL B157 (1985) 326, PL B158 (1985) 525, PL B160 (1985) 331, PL B162 (1985) 395, PL B163 (1985) 404, ZPHY C29 (1985) 167, NIM A249 (1986) 277, NIM A252 (1986) 384, PTE 2 (1986) 66, PRL 56 (1986) 549, PL B167 (1986) 360, ZPHY C31 (1986) 181, PL B179 (1986) 398, PL B179 (1986) 403, PL B182 (1986) 95, ZPHY C33 (1986) 7, ZPHY C33 (1987) 359, PL B185 (1987) 218, PL B185 (1987) 223, PL B185 (1987) 228, PL B187 (1987) 425, PL B192 (1987) 245, PL B195 (1987) 102, PL B195 (1987) 307, PL B196 (1987) 101, PL B197 (1987) 452, PL B198 (1987) 255, PL B198 (1987) 577, ZPHY C35 (1987) 283, PL B199 (1987) 291, PL B199 (1987) 447, PL B199 (1987) 451, PL B199 (1987) 457, PL B199 (1987) 580, PL B202 (1988) 149, ZPHY C39 (1988) 177, PL B207 (1988) 109, PL B207 (1988) 349, PL B209 (1988) 119, PL B209 (1988) 380, PL B210 (1988) 258, PL B210 (1988) 263, PL B210 (1988) 267, PL B210 (1988) 273, PL B211 (1988) 489, PL B212 (1988) 528, PL B215 (1988) 424, PL B215 (1988) 429, ZPHY C41 (1988) 1, ZPHY C41 (1988) 405, NIM A274 (1989) 189, NIM A275 (1989) 1, NIM A283 (1989) 544, NAT WISS 76 (1989) 52, ZPHY C41 (1989) 557, PL B217 (1989) 205, PL B219 (1989) 121, PL B221 (1989) 422, ZPHY C42 (1989) 349, ZPHY C42 (1989) 519, ZPHY C42 (1989) 543, ZPHY C43 (1989) 45, ZPHY C43 (1989) 181, ZPHY C44 (1989) 547, PL B229 (1989) 175, PL B229 (1989) 304, PL B230 (1989) 162, PL B230 (1989) 169, PL B231 (1989) 208, PL B232 (1989) 398, PL B232 (1989) 554, MPL A5 (1990) 73, ZPHY A335 (1990) 231, ZPHY C46 (1990) 9, ZPHY C46 (1990) 15, ZPHY C48 (1990) 183, ZPHY C48 (1990) 543, PL B234 (1990) 409, PL B236 (1990) 102, PL B241 (1990) 278, PL B245 (1990) 315, PL B246 (1990) 278, PL B247 (1990) 121, PL B249 (1990) 359, PL B250 (1990) 164, PL B254 (1991) 288, PL B255 (1991) 297, PL B255 (1991) 634, PL B260 (1991) 259, PL B262 (1991) 148, PL B267 (1991) 535, PL B269 (1991) 234, ZPHY C49 (1991) 349, ZPHY C50 (1991) 1, ZPHY C52 (1991) 353, PL B274 (1992) 239, PL B275 (1992) 195, PL B277 (1992) 209, PL B278 (1992) 202, PL B288 (1992) 367, PL B292 (1992) 221, PL B297 (1992) 425, ZPHY C53 (1992) 361, ZPHY C53 (1992) 367, ZPHY C54 (1992) 1, ZPHY C54 (1992) 13, ZPHY C55 (1992) 25, ZPHY C55 (1992) 179, ZPHY C55 (1992) 357, ZPHY C56 (1992) 1, ZPHY C56 (1992) 7, ZPHY C56 (1992) 339, MPL A8 (1993) 573, PL B303 (1993) 368, PL B308 (1993) 435, PL B316 (1993) 608, PL B317 (1993) 227, PL B318 (1993) 397, ZPHY C57 (1993) 533, ZPHY C58 (1993) 61, ZPHY C58 (1993) 191, ZPHY C58 (1993) 199, ZPHY C60 (1993) 11, NIM A348 (1994) 465, PL B324 (1994) 249, PL B326 (1994) 320, PL B332 (1994) 451, PL B335 (1994) 526, PL B337 (1994) 383, PL B338 (1994) 390, PL B340 (1994) 125, PL B340 (1994) 217, ZPHY C61 (1994) 1, ZPHY C62 (1994) 371, ZPHY C64 (1994) 375, PL B341 (1995) 441, PL B342 (1995) 397, PL B349 (1995) 576, PL B353 (1995) 554, ZPHY C65 (1995) 619, ZPHY C66 (1995) 63, ZPHY C68 (1995) 25, ZPHY C68 (1995) 215, NIM A373 (1996) 387, PL B374 (1996) 249, PL B374 (1996) 256, PL B374 (1996) 265, and ZPHY C69 (1996) 405.

Related experiments CESR-CLEO-II

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WWW Home-page
http://www.physik.uni-dortmund.de/ARGUS/argus.html

DESY-HERA-HERMES

(Proposed Jan 1990, Approved Oct 1992, Began data-taking 1995, In progress)

MEASUREMENT OF SPIN DEPENDENT STRUCTURE FUNCTIONS OF NUCLEONS

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Accelerator DESY-HERA *Detector* Spectrometer

Reactions Polarized target

e^- nucleon $\rightarrow e^-$ X 27.5 GeV/c (P_{lab})

Particles studied *p*, *n*

Brief description This is an internal target experiment in the HERA electron storage ring. It measures both inclusive and semi-inclusive spin dependent deep inelastic scattering from the proton and neutron, and tests the fundamental Bjorken sum rule. Employs polarized internal gas targets of hydrogen, deuterium, and ^{3}He. Internal targets have the advantage of being pure atomic species with no dilution factor. The angles and the energies of scattered particles are determined by a magnetic spectrometer. Taking date (July 96).

Journal papers NIM A (in press).

Related experiments CERN-NA-047, SLAC-E-142, SLAC-E-143, SLAC-E-154

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WWW Home-page http://dxhra1.desy.de/

DESY-HERA-H1

(Proposed Jun 1985, Approved Jul 1986, Began data-taking May 1992, In progress)

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Accelerator DESY-HERA *Detector* H1

Reactions

$e^- p$ —

Brief description Measures energy and direction of electrons, photons, and particle jets. Identifies leptons by the shower shape and neutrinos by precise missing energy measurements. The detector consists of a large superconducting solenoid with tracking chambers and a liquid argon calorimeter inside. An additional iron absorber instrumented with streamer tubes is outside the solenoidal coil. In 1995, the backward (electron) direction EM calorimeter was replaced by a SpaCal-type electromagnetic + hadronic calorimeter, and Roman pots were added in the forward (proton) direction to measure elastically scattered protons. In 1996, silicon vertex detectors were added in the barrel (CST) and backward (BST) directions, and a SpaCal-type neutron counter installed in the forward direction. Taking data (July 96).

Journal papers NIM A240 (1985) 63, NIM A253 (1987) 467, NIM A257 (1987) 479, NIM A265 (1988) 419, NIM A269 (1988) 560, NIM A270 (1988) 334, IEEE TNS 36 (1989) 331, NIM A275 (1989) 197, NIM A275 (1989) 246, NIM A277 (1989) 368, NIM A279 (1989) 57, NIM A279 (1989) 217, NIM A283 (1989) 375, NIM A283 (1989) 467, NIM A283 (1989) 471, NIM A283 (1989) 487, NIM A283 (1989) 537, NIM A283 (1989) 622, NP (PROC SUPPL) 16 (1989) 518, NIM A289 (1990) 446, NIM A302 (1991) 277, NIM A310 (1991) 535, NIM A312 (1992) 457, NIM A323 (1992) 184, NIM A323 (1992) 401, NIM A323 (1992) 532, NIM A323 (1992) 537, NIM A336 (1993) 460, NIM A336 (1993) 499, PL B297 (1992) 205, NIM A336 (1993) 460, NIM A336 (1993) 499, PL B298 (1993) 469, PL B299 (1993) 374, PL B299 (1993) 385, PL B314 (1993) 436, NP B396 (1993) 3, NP B407 (1993) 515, NIM A344 (1994) 492, NIM A350 (1994) 57, PL B321 (1994) 161, PL B324 (1994) 241, PL B328 (1994) 176, PL B338 (1994) 507, PL B340 (1994) 205, APP B25 (1994) 319, APP B25 (1994) 1883, NC 107A (1994) 2109, NC 107A (1994) 2345, ZPHY C61 (1994) 59, ZPHY C63 (1994) 377, ZPHY C64 (1994) 545, NP B429 (1994) 477, PL B346 (1995) 415, PL B348 (1995) 681, PL B353 (1995) 578, PL B354 (1995) 494, PL B356 (1995) 118, PL B358 (1995) 412, ZPHY C66 (1995) 529, ZPHY C67 (1995) 565, ZPHY C69 (1995) 27, NP B435 (1995) 3, NP B439 (1995) 471, NP B445 (1995) 3, NP B445 (1995) 195, NP B449 (1995) 3, NIM A372 (1996) 188, NIM A372 (1996) 399, NIM A374 (1996) 149, PL B369 (1996) 173, PL B279 (1996) 319, ZPHY C70 (1996) 17, ZPHY C70 (1996) 609, NP B463 (1996) 3, NP B468 (1996) 3, and NP B470 (1996) 3.

Related experiments DESY-HERA-ZEUS

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DESY-HERA-ZEUS

(Proposed Jun 1985, Mar 1986, Approved Nov 1986, Began data-taking May 1992, In progress)

ZEUS: A DETECTOR FOR HERA

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HAMBURG U – B D Burow, A Dannemann, L Hagge, U Holm, D Horstmann, E Lohrmann, G Poelz, W Schott, R Sinkus, K Wick, F Zetsche
IMPERIAL COLL – T C Bacon, N Brummer, I Butterworth, V L Harris, G Howell, B Y H Hung, L Lamberti, K R Long, D B Miller, N Pavel, A Prinias, J K Sedgbeer, D Sideris, A Whitfield
IOWA U – U Mallik, M Z Wang, S M Wang, J T Wu
JULICH, FORSCHUNGSZENTRUM – P Cloth, D Filges
KOREA U – S H An, G H Cho, B J Ko, S B Lee, S W Nam, H S Park, S K Park
LOUISIANA STATE U – S Kartik, H J Kim, R R McNeil, W Metcalf, V K Nadendla
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MOSCOW PHYS ENG INST – V Bashkirov, B A Dolgoshein, A Stifutkin
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NIKHEF, AMSTERDAM & AMSTERDAM U – M Botje, F Chlebana, M de Kamps, E de Wolf, J Engelen, P Kooijman, A Kruse, H Tiecke, A Van Sighem, R van Woudenberg, W Verkerke, J Vossebeld, M Vreeswijk, L Wiggers
OHIO STATE U – D Acosta, B Bylsma, L S Durkin, J Gilmore, C Li, T Y Ling, P Nylander, I H Park, T A Romanowski
OXFORD U – D Bailey, R J Cashmore, A M Cooper-Sarkar, R C E Devenish, N Harnew, M Lancaster, L Lindemann, J McFall, C Nath, V A Noyes, A Quadt, J R Tickner, H Uijterwaal, R Walczak, D S Waters, F F Wilson, T Yip
PADUA U & INFN, PADUA – A Bertolin, R Brugnera, R Carlin, F Dal Corso, M De Giorgi, U Dosselli, S Limentani, M Morandin, M Posocco, L Stanco, R Stroili, C Voci, F Zuin
PENN STATE U – J Bulmahn, R G Feild, B Y Oh, J Whitmore
ROME U & INFN, ROME – G D'Agostini, G Marini, A Nigro
RUTHERFORD – J C Hart, N A McCubbin, T P Shah

UC, SANTA CRUZ – E Barberis, T Dubbs, C Heusch, W Lockman, J T Rahn, H F Sadrozinski, A Seiden, M Van Hook, D C Williams
SIEGEN U – J Biltzinger, O Schwarzer, R J Seifert, A H Walenta
TEL AVIV U – H Abramowicz, G Briskin, S Dagan, A Levy
TOKYO U, INS – J I Fleck, M Inuzuka, T Ishii, M Kuze, S Mine, M Nakao, I Suzuki, K Tokushuku, K Umemori, S Yamada, Y Yamazaki
TOKYO METROPOLITAN U – M Chiba, R Hamatsu, T Hirose, K Homma, S Kitamura, T Matsushita, K Yamauchi
TURIN U & INFN, TURIN – R Cirio, M Costa, M I Ferrero, S Maselli, C Peroni, R Sacchi, A Solano, A Staiano
TURIN U, ALESSANDRIA & INFN, TURIN – M Dardo
TORONTO U – D C Bailey, F Benard, M Brkic, C P Fagerstrom, G F Hartner, K K Joo, G M Levman, J F Martin, R S Orr, S Polenz, C R Sampson, D Simmons, R J Teuscher
UNIVERSITY COLL, LONDON – J M Butterworth, C D Catterall, T W Jones, P B Kaziewicz, J B Lane, R L Saunders, J Shulman, M R Sutton
VIRGINIA TECH – B Lu, L W Mo
WARSAW U, IEP – W Bogusz, J Ciborowski, J Gajewski, G Grzelak, M Kasprzak, M Krzyzanowski, K Muchorowski, R J Nowak, J M Pawlak, T Tymieniecka, A K Wroblewski, J A Zakrzewski, A F Zarnecki
WARSAW, INST NUCL STUDIES – M Adamus
WEIZMANN INST – C Coldewey, Y Eisenberg, D Hochman, U Karshon, D Revel, D Zer-Zion
WISCONSIN U – W F Badgett, J Breitweg, D Chapin, R Cross, S Dasu, C Foudas, R J Loveless, S Mattingly, D D Reeder, S Silverstein, W H Smith, A Vaiciulis, M Wodarczyk
YORK U, CANADA – S Bhadra, M L Cardy, W R Frisken, M Khakzad, W N Murray, W B Schmidke

Accelerator DESY-HERA *Detector* ZEUS

Reactions

$e^- p$	300 GeV (E_{cm})
$e^+ p$	"

Particles studied leptons, p, K^0, Λ, strange, ρ^0, ω, ϕ, $J/\psi(1S)$, vmeson, charm

Brief description Measures neutral and charged current processes in electron–proton and positron–proton interactions (27.5 GeV on 820 GeV) and searches for new interactions and new particles. The detector emphasis is on accurate identification and measurement of jets and leptons. The main detector components are a high-resolution compensating uranium-scintillator calorimeter and a central tracking detector surrounded by a superconducting coil. An instrumented iron absorber catches the tail of hadronic showers and identifies muons. A large fraction of the solid angle is further covered by muon detectors. Bending magnets of the machine are used as spectrometers for forward scattered protons. Additional calorimeters measure forward neutron production and tag electrons and positrons scattered with small transverse momentum. Taking data (July 96).

Journal papers IEEE TNS 36 (1989) 465, NIM A274 (1989) 134, NIM A289 (1990) 115, NIM A290 (1990) 95, NIM A292 (1990) 259, NIM A300 (1991) 480, NIM A306 (1991) 485, NIM A309 (1991) 101, NIM A313 (1992) 126, NIM A321 (1992) 356, PL B297 (1992) 404, PL B293 (1992) 465, NIM A333 (1993) 342, NIM A336 (1993) 23, PL B303 (1993) 183, PL B306 (1993) 158, PL B306 (1993) 173, PL B315 (1993) 481, PL B316 (1993) 207, PL B316 (1993) 412, ZPHY C59 (1993) 231, NIM A338 (1994) 254, NIM A342 (1994) 260, PL B322 (1994) 287, PL B332 (1994) 228, PL B338 (1994) 483, NC 107A (1994) 2123, ZPHY C63 (1994) 391, PL B342 (1995) 417, PL B345 (1995) 576, PL B346 (1995) 399, PL B348 (1995) 665, PL B349 (1995) 225, PL B350 (1995) 120, PL B354 (1995) 163, PL B356 (1995) 129, PL B356 (1995) 601, PL B363 (1995) 201, PRL 75 (1995) 1006, ZPHY C65 (1995) 379, ZPHY C65 (1995) 627, ZPHY C67 (1995) 81, ZPHY C67 (1995) 93, ZPHY C67 (1995) 227, ZPHY C68 (1995) 29, ZPHY C68 (1995) 113, ZPHY C68 (1995) 569, ZPHY C69 (1995) 39, PL B369 (1996) 55, ZPHY C69 (1996) 607, ZPHY C70 (1996) 1, and ZPHY C70 (1996) 391.

Related experiments DESY-HERA-H1

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DESY-HERA-B

(Proposed May 1994, Approved Jun 1994, Feb 1995, In preparation)

AN EXPERIMENT TO STUDY *CP* VIOLATION IN THE *B* SYSTEM USING AN INTERNAL TARGET AT THE HERA PROTON RING

HERA-B COLLABORATION

Accelerator DESY-HERA *Detector* Spectrometer

Brief description The main goal is to measure the violation of CP symmetry in the decay channel $B \rightarrow K^0_S J/\psi$. Uses the 820 GeV HERA proton ring and an internal fixed target. The target consists of a set of movable wires which act like collimators in the halo of the proton beam. The detector provides a good B decay vertex resolution, lepton and kaon identification, and multiple events reconstruction per bunch crossing. A 2 m long vertex detector consists of layers of double-sided silicon with perpendicular orientation to the beam. It is followed by tracking chambers inside the spectrometer magnet which provides a field integral of 2.2 Tm, by RICH and TRD counters for particle identification, and by the electromagnetic calorimeter and the muon system. The collaboration consists of about 240 physicists from thirteen countries and more than 30 institutions. Expected to begin data taking in June 1998. For more information, please contact the Spokesperson, Dr. Andreas Schwarz [DESY].

Related experiments CERN-WA-089, FNAL-771, FNAL-789

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WWW Home-page http://www-hera-b.desy.de/

DESY Future Plans

The HERA accelerator experiments remain in the focus of particle physics research at DESY in the coming years. H1 and ZEUS, the two collision experiments using the 27-GeV electron/positron beam and 820-GeV proton beam will continue to study the proton structure functions at very low x, test the QCD and electroweak interactions and search for new phenomena. HERMES, which uses a longitudinally polarized electron/positron beam and a polarized nucleon gas target, will keep investigating the origin of the nucleon spin. The second beam–target experiment, HERA-B, which is scheduled to begin the study of CP violation in the B meson system in 1998, will use the proton beam and an internal aluminum wire target. In machine physics, the efforts are focused on the Next Accelerator project, an electron–positron linear collider at 500 GeV c.m. International collaborations based at DESY are studying two possible paths: One is the S-Band Linear Collider (SBLC) which uses normally-conducting copper resonators operating in the frequency region of 3 GHz, and the other is the TeV-Energy Superconducting Linear Accelerator (TESLA) with superconducting accelerating structures operating in the frequency region of 1.3 GHz. TESLA is the only linear collider project worldwide which uses the integrated X-ray lasers. Test facilities for both projects are under construction at DESY.

Selected FNAL Experiments

FNAL-665

(Proposed Oct 1980, Approved Jul 1981, Jan 1989, Began data-taking 1987, Completed data-taking Jan 1992)

MUON SCATTERING WITH HADRON DETECTION AT THE TEVATRON

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ARGONNE – D F Geesaman, R Gilman, M C Green, H E Jackson, S Kaufman, E R Kinney, T B W Kirk, D H Potterveld, S Tentindo-Repond, H J Trost, A Zghiche
UC, SAN DIEGO – R D Kennedy, H G E Kobrak, P Madden, J R Ostrick, A Salvarani, R A Swanson
FERMILAB – B R Baller, G B Coutrakon, J E Hanlon, S Krzywdzinski, H Melanson, H E Montgomery, J G Morfin, C Salgado, S A Wolbers
HARVARD U – J M Conrad, G Y Fang, A V Kotwal, D G Michael, R B Nickerson, F M Pipkin, M H Schmitt, R Wilson
ILLINOIS U, CHICAGO – M R Adams, D A Averill, T J Carroll, R S Guo, C Halliwell, D E Jaffe, S R Magill, D W Mcleod, T McKibben
CRACOW – A Eskreys, J Figiel, P Malecki, K Olkiewicz, B Pawlik, P Stopa
CRACOW, INST PHYS NUCL TECH – K Dziunikowska
LIVERMORE – P L Anthony, F S Dietrich
MARYLAND U – S Aid, S Kunori, S C O'Day, E J Ramberg, A Skuja, G A Snow, P H Steinberg, R Talaga
MIT – M Baker, W Busza, L S Osborne, J J Ryan
MUNICH, MAX PLANCK INST – M Aderholz, F Botterveck, I Derado, V Eckardt, H J Gebauer, D Hantke, G Jancso, K Kadija, N Koschorz, A S Manz, P Mooshofer, N Schmitz, H J Seyerlein, S Soldner-Rembold, M Vidal, W Wittek
NORTHWESTERN U – H M Schellman (√ Spokesperson), P Spentzouris
OHIO U – H L Clark, R W Finlay, K H Hicks
PENN U – A Banerjee, K Griffioen
WASHINGTON U, SEATTLE – A A Bhatti, U Bratzler, R Davisson, W M Dougherty, D M Jansen, Z Jin, J J Lord, H J Lubatti, M J Mitchell, R S Perry, B Venema, R J Wilkes, T C Zhao
WUPPERTAL U – H M Braun, H Breidung, U Ecker, R Otten, A Roeser
YALE U – S K Dhawan, V W Hughes, V Papavassiliou, K P Schueler, H Venkataramania

Accelerator FNAL-TEV *Detector* CCM

Reactions Polarized beam

muon e^- → muon e^-	< 750 GeV/c
muon p → muon hadrons	"
muon p → muon ρ X	"
muon p → muon ϕ X	"
muon deut → muon hadrons	"
muon deut → muon ρ X	"
muon deut → muon ϕ X	"
muon nucleus → muon hadrons nucleus	"
muon nucleus → muon hadrons n	"
muon nucleus → muon ρ X	"
muon nucleus → muon ϕ X	"

Brief description Studies (1) the properties of hadron systems recoiling from deep inelastic muon collisions, (2) the nucleon structure functions, and (3) exclusive vector meson production. Uses the superconducting vertex magnet from CERN. The first run was completed in 1988, the second run, with a number of different targets (H_2, D_2, C, Ca, Xe, and Pb) and an upgrade of the vertex spectrometer tracking system, in 1990/91. Data analysis in progress (July 96).

Journal papers IEEE TNS 33 (1986) 205, NIM A291 (1990) 533, PL B272 (1991) 163, PL B287 (1992) 375, PRL 68 (1992) 3266, PRL 69 (1992) 1026, PL B308 (1993) 418, PL B309 (1993) 477, PR D48 (1993) 5057, PRL 72 (1994) 466, PL B335 (1994) 535, ZPHY C61 (1994) 179, ZPHY C61 (1994) 539, PR D50 (1994) 1836, PRL 74 (1995) 1525, PRL 74 (1995) 5198, PRL 75 (1995) 1466, ZPHY C65 (1995) 225, ZPHY C67 (1995) 403, ZPHY C71 (1996) 391, and PR D54 (1996) (in print).

Related experiments FNAL-098

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FNAL-672A

(Proposed Feb 1981, Approved Jul 1981, Began data-taking 1987, Completed data-taking Jan 1992)

A STUDY OF HADRONIC FINAL STATES PRODUCED IN ASSOCIATION WITH HIGH-MASS DIMUONS

FERMILAB – J C Krider
ILLINOIS U, CHICAGO – H S Goldberg, R L Jesik, H Mendez, J Solomon, F Vaca
INDIANA U – R R Crittenden, A R Dzierba, A M Gribushin, S Kartik, J Li, R Li, T R Marshall, H J Martin, P T Smith, T Sulanke, A Zieminski (Spokesperson)
LOUISVILLE U – C L R Davis
MICHIGAN U, FLINT – L J Dauwe
SERPUKHOV – V V Abramov, Y M Antipov, B Baldin, S P Denisov, A Dyshkant, V Glebov, Y Gorin, V I Koreshev, A Krinitsyn, A A Petrukhin, V Podstavkov, V I Sirotenko, R Sulayev

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

p nucleus → $\mu^+ \mu^-$ X	500, 800 GeV/c
π^- nucleus → $\mu^+ \mu^-$ X	500 GeV/c

Particles studied $J/\psi(1S)$, $\psi(2S)$, $\chi_{c1}(1P)$, $\chi_{c2}(1P)$, ρ, ω, ϕ, bottom

Brief description Studies particles produced in association with vector mesons (including J/ψ) and high mass dimuons. Ran with H, Be and Cu targets. Collected approximately 2M fully linked dimuon events (over 30K ψ's) with different beams. Uses E672/E706 spectrometer. Data analysis in progress (May 96).

Journal papers NIM A270 (1988) 99, PR D41 (1990) 1, PRL 74 (1995) 495, and PR D53 (1996) 4723.

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FNAL-687

(Proposed Jan 1981, Approved Dec 1983, Began data-taking 1987, Completed data-taking Jan 1992)

HIGH-ENERGY PHOTOPRODUCTION OF STATES CONTAINING HEAVY QUARKS AND OTHER RARE PHENOMENA

E687 COLLABORATION
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COLORADO U – C W Bogart, H W K Cheung, P Coteus, S W Culy, J P Cumalat (√ Spokesperson), C J Dallapiccola, D P Edmonds, J Ginkel, V Greene, G Introzzi, W E Johns, R L Ladbury, M Nehring, G E Schultz
FERMILAB – M E Binkley, J N Butler (√ Spokesperson), S Cihangir, I Gaines, P H Garbincius, L Garren, M F Gormley, S A Gourlay, D J Harding, P H Kasper, A E Kreymer, P L G Lebrun, J Peoples, Jr , S Shukla, J T Volk
FRASCATI – S Bianco, S Camponeschi, F Celani, G Digiovanni, M Enorini, F Fabbri, G Ferretti, M Giardoni, G Giraudo, A Maccari, L Passamonti, D Riondino, G Rivellini, V Russo, S Sarwar, A Scotti Di Uccio, A Zallo
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KOREA U – B G Cheon, J S Kang, K Y Kim
MILAN U & INFN, MILAN – G Alimonti, G Bacchiocchi, G Bellini, L Bodini, D Brambilla, B Caccianiga, W R Cavaletti,

L Cinquini, P D'Angelo, M Di Corato, P A Falbo, P Frabetti, M G Giammarchi, S Grabar, D Hazan, P Inzani, F Leveraro, E Macavero, S Malvezzi, P F Manfredi, G Massimiliano, M Mazzanti, D Menasce, S Meneghini, E Meroni, L Moroni, S Moroni, G Oriani, F Palombo, D Pedrini, L Perasso, F Ragusa, A Sala-Grabar, S Sala, M Szaswlowski, D Torretta, M Vittone, F Zuffa
NORTHWESTERN U – M Artuso, T N Boulos, D A Buchholz, D R Claes, B Gobbi, B O'Reilly, S-W Park, R A Schluter, R Yoshida
NOTRE DAME U – J M Bishop, N N Biswas, J K Busenitz, N M Cason, J D Cunningham, S Grenquist, C J Kennedy, V P Kenney, G N Kim, T F Lin, J Maier, E Mannel, A P Mcmanus, R J Mountain, D L Puseljic, R C Ruchti, W D Shephard, J A Swiatek, P Wilkins, Z Y Wu, M E Zanabria
PAVIA U – V Arena, G Belli, G Boca, C Castoldi, S Cerlesi, R Diaferia, G Ferretti, C Fontana, G Fontana, G Gianini, S Rahti, S P Ratti, S Rescia, C Riccardi, V Speziali, P Trespi, L Viola, P Vitulo
UC, DAVIS – G P Grim, V Paolone, P M Yager
PUERTO RICO U, RIO PIEDRAS – A Lopez, L Mendez, J C Palathingal
MEXICO, IPN – H Mendez
NORTH CAROLINA U – T F Davenport
TENNESSEE U – G Blackett, W Bugg, K Danyo, T Handler, G Kondo, M Phisharody

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

γ nucleus $\rightarrow$ X	< 350 GeV/c
γ nucleus $\rightarrow$ charm X	"
γ nucleus $\rightarrow$ charm $\overline{\text{charm}}$ X	"
γ nucleus $\rightarrow \mu^+ \mu^-$ X	"
γ nucleus $\rightarrow$ lepton$^+$ lepton$^-$ X	"

Particles studied charmed-meson, charmed-baryon

Brief description Continues studies of FNAL-087 and -401. Uses bremsstrahlung photons from a wide band 350 GeV ($\pm$15%) electron beam, a new large-aperture multiparticle spectrometer, a beryllium target, and a silicon microstrip decay-vertex detector. Studies the dynamics of heavy quark photoproduction, and decays of charm particles. Data analysis in progress (July 96).

Journal papers IEEE TNS 30 (1983) 3768, NIM A225 (1984) 619, NIM A241 (1985) 107, NIM A251 (1986) 40, NIM A252 (1986) 366, PL B251 (1990) 639, PL B263 (1991) 584, NIM A305 (1991) 48, NP (PROC SUPPL) 27 (1992) 207, PL B300 (1993) 190, PL B307 (1993) 262, PL B308 (1993) 193, PL B313 (1993) 253, PL B314 (1993) 477, PL B315 (1993) 203, PL B316 (1993) 197, PRL 70 (1993) 1381, PRL 70 (1993) 1755, PRL 70 (1993) 2058, PRL 71 (1993) 827, PL B321 (1994) 295, PL B323 (1994) 459, PL B328 (1994) 187, PL B328 (1994) 193, PL B331 (1994) 217, PL B338 (1994) 106, PL B340 (1994) 254, PRL 72 (1994) 324, PRL 72 (1994) 961, NC 107A (1994) 2025, PR D50 (1994) 2953, PL B346 (1995) 199, PL B351 (1995) 591, PL B354 (1995) 486, PL B357 (1995) 678, PL B359 (1995) 403, PL B363 (1995) 259, PL B364 (1995) 127, PL B365 (1996) 461, and PL B370 (1996) 222.

Related experiments FNAL-831

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FNAL-690

(Proposed Feb 1981, Approved Jul 1981, Nov 1983, Apr 1987, Began data-taking 1990, Completed data-taking Jan 1992)

STUDY OF HADRONIC PRODUCTION AND SPECTROSCOPY OF STRANGE, CHARM AND BOTTOM PARTICLES AT THE TEVATRON

COLUMBIA U – A G Gara, B C Knapp (√ Spokesperson)
ILLINOIS U, URBANA – E Gottschalk
FERMILAB – D C Christian, G Gutierrez, A A Wehmann
GUANAJUATO U – J Felix, G Moreno, M Reyes, M Sosa
MASSACHUSETTS U – M C Berriso, E P Hartouni, M N Kreisler, S Lee, K Markianos, M Wang, D Wesson

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

$p\,p \rightarrow p$ X	800 GeV/c

Particles studied strange, charm, bottom

Brief description Initial goals include (1) a systematic study of exclusive reactions, particularly diffraction dissociation, (2) cataloging of the remaining stable charmed particles, with details of production and decay, and (3) determining the scale of bottom production. Uses an innovative spectrometer with a hardware processor. Current focus is on the study of the charm production cross-section in diffraction dissociation and spin/parity analysis of centrally produced light mesons. Data analysis in progress (July 96).

Journal papers NC 107A (1994) 1847.

Related experiments BNL-766

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FNAL-740 (DZERO)

(Proposed Sep 1983, Approved Feb 1984, Began data-taking May 1992, In progress)

STUDY OF $\overline{p}p$ COLLISIONS USING A LARGE DETECTOR AT D0

D0 COLLABORATION
ANDES U, BOGOTA – B Gomez, R Gomez, B Hoeneisen, D Mendoza, P Mooney, P Nechev, J P Negret, J M R Roldan, A Serna, M E Zanabria
ARIZONA U – K P Davis, D K Fein, G E Forden, J A Guida, R Jayanti, K A Johns, A M Narayanan, J P Rutherfoord, M A Shupe, D Vititoe
BOSTON U – J M Butler
BROOKHAVEN – B Gibbard, H A Gordon, N Graf, S A Kahn, J R Kotcher, S D Protopopescu, S Snyder
BROWN U – J W Bantly, D Cullen-Vidal, D Cutts, T Fahland, J M Guida, J S Hoftun, F Nang, R A Partridge, G T Watts
BUENOS AIRES U – S Grinstein, R Piegaia
UC, DAVIS – P C Bloom, R Breedon, Y V Fisyak, S M Glenn, G Grim, C B Klopfenstein, W Ko, R L Lander, S Mani, D E Pellett
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UC, RIVERSIDE – J H Cochran, Jr , J A Ellison, P Gartung, A P Heinson, M Mason, S J Wimpenny
RIO DE JANEIRO, CBPF – G A Alves, W P Carvalho, H Da Motta Filho, J M De Miranda, A K A Maciel, M Mendes, J M Miranda, L J P Moreira, M Nicola, A F D S Santoro, M H G Souza, A Sznajder, M Vaz
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COLUMBIA U – I M Adam, A Kotwal, P M Tuts, B Winer
DELHI U – V Bhasin, M Bhattacharjee, R K Shivpuri, S K Soni
DUBNA – G D Alexeev, V I Dodonov, A V Efremov, Y A Gornushkin, M A Ignatenko, N N Khovansky, Z V Krumstein, L K Lytkin, V L Malyshev, A A Nozdrin, I L Pisarev, T O Rudenko, N A Russakovich, B M Sabirov, A B Sadovsky, Y V Sedykh, A N Sissakian, L G Thatchev, V V Tokmenine, E G Tskhadadze, L S Vertogradov, Y A Yatsunenko, A I Zinchenko
FERMILAB – S C Ahn, B Baldin, J F Bartlett, P C Bhat, G C Blazey, A S Boehnlein, F O Borcherding, A Brandt, A D Bross, J H Christenson, W E Cooper, M Demarteau, D S Denisov, H T Diehl, M Diesburg, S Feher, H E Fisk, S C Fuess, K Genser, C E Gerber, D R Green, H B Greenlee, W X Gu, H F Haggerty, S Hansen, U Heintz, J D Hobbs, T Hu, A S Ito, M E Johnson, A M Jonckheere, H Jostlein, B Klima, S Krzywdzinski, G Landsberg, Q H Li-Demarteau, R J Lipton, Q Liu, L Lueking, H S Mao, M I Martin, H L Melanson, K W Merritt, C S Mishra, N Mokhov, H E Montgomery (√ Spokesperson), M Narain, N Oshima, A Para, P Z Quintas,

R Raja, P A Rapidis, W Smart, R P Smith, M A Tartaglia, W J Womersley, R Yamada
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FLORIDA STATE U – S K Blessing, S L Hagopian, V Hagopian, T C Heuring, R J Hirosky, S L Linn, R W Madden, J McDonald, H Piekarz, H B Prosper, C Shaffer, H D Wahl, G L Wang, S Youssef
HAWAII U – J Balderston, M A Cummings, M D Jones, M W Peters, C Y Yoshikawa
ILLINOIS U, CHICAGO – M R Adams, M Chung, H S Goldberg, T M McKibben, II , C R Murphy, J Solomon
INDIANA U – G Alvarez, T Hu, R L Jesik, T R Marshall, D Zieminska, A Zieminski
IOWA STATE U – E W Anderson, J M Hauptman, B Lauer, J A Wightman
KOREA U – J S Kang, C L Kim
KYUNGSUNG U – Y M Park
CRACOW – A Eskreys, J Figiel, B Pawlik, P Stopa
LBL – A R Clark, O I Dahl, P M Grudberg, S C Loken, R J Madaras, M L Stevenson, M W Strovink, T G Trippe, E W Varnes
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PANJAB U – S Beri, V Bhatnagar, J M Kohli, H Singh, J Singh, P M Sood
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RICE U – D L Adams, G W Eppley, H E Miettinen, B P Padley, E Platner, P P Yepes
RIO DE JANEIRO STATE U – J R T de Mello Neto, J G R Lima, V Oguri
ROCHESTER U – D P Casey, C E Cretsinger, M K Fatyga, T Ferbel, S Grunendahl, K S Hahn, F Lobkowicz, M F Paterno, E Won, Z H Zhu, M Zielinski
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TEXAS A AND M – L T Goss, F R Huson, D M Norman, J T White, J V D Wirjawan

Accelerator FNAL-COLLIDER *Detector* D0

Reactions

$\overline{p}\,p$ 2000 GeV (E_{cm})

Particles studied W^+, W^-, Z^0, bottom, top

Brief description The experiment studies the properties of 2-TeV $\overline{p}p$ collisions with particular emphasis on measurement and identification of jets, leptons and missing transverse momentum. The detector incorporates three main systems: a central detector, uranium–liquid argon calorimetry over nearly 4π solid angle, and a magnetized iron muon spectrometer. Data was taken from 1992 to early 1996 (Run I), with physics covering the top quark properties, precision electroweak measurements, studies of QCD, b-quark production and searches for new particles and phenomena. The detector is being upgraded for operation in 1999 with the higher luminosity upgraded Collider. Tracking detectors will be replaced with silicon strip and scintillating fiber detectors in a solenoidal magnetic field, and other detectors upgraded for higher rate operation. Upgrade in progress (July 96).

Journal papers IEEE TNS 32 (1985) 1473, NIM A244 (1986) 356, NIM A247 (1986) 107, CPC 45 (1987) 245, IEEE TNS 34 (1987) 710, NIM A256 (1987) 305, NIM A257 (1987) 556, NIM A261 (1987) 420, NIM A263 (1988) 78, NIM A265 (1988) 157, NIM A269 (1988) 492 [erratum: NIM A273 (1988) 453], NIM A277 (1989) 401, NIM A279 (1989) 107, NIM A279 (1989) 243, NIM A279 (1989) 310, NIM A279 (1989) 331, NIM A279 (1989) 359, NIM A280 (1989) 36, IEEE TNS 36 (1989) 384, NIM A289 (1990) 438, NIM A289 (1990) 543, NIM A290 (1990) 122, NIM A290 (1990) 346, NIM A293 (1990) 125, NIM A297 (1990) 121, IEEE TNS 38 (1991) 286, IEEE TNS 38 (1991) 398, NP (PROC SUPPL) 23B (1991) 402, NIM A324 (1993) 53, NIM A325 (1993) 393, NP (PROC SUPPL) 32 (1993) 29, NP (PROC SUPPL) 32 (1993) 83, NIM A338 (1994) 185, NIM A342 (1994) 33, NIM A351 (1994) 72, NIM A351 (1994) 77, PRL 72 (1994) 965, PRL 72 (1994) 2138, PRL 72 (1994) 2332, NIM A366 (1995) 263, NP (PROC SUPPL) 44 (1995) 12, NP (PROC SUPPL) 44 (1995) 153, PL B357 (1995) 500, PL B358 (1995) 405, PRL 74 (1995) 2422, PRL 74 (1995) 2632, PRL 74 (1995) 3548, PRL 75 (1995) 618, PRL 75 (1995) 1023, PRL 75 (1995) 1028, PRL 75 (1995) 1034, PRL 75 (1995) 1456, PRL 75 (1995) 3226, PRL 75 (1995) 3618, PR D52 (1995) 4877, PL B370 (1996) 239, PRL 76 (1996) 734, PRL 76 (1996) 2222, PRL 76 (1996) 2228, PRL 76 (1996) 3271, and PR D53 (1996) 6000.

Related experiments FNAL-823

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WWW Home-page http://d0sgi0.fnal.gov/

FNAL-741 (CDF)

(Proposed Aug 1981, Approved Apr 1982, Began data-taking 1987, In progress)

STUDY OF $\overline{p}p$ COLLISIONS USING A LARGE DETECTOR AT B0 — THE CDF DETECTOR

CDF COLLABORATION
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HIROSHIMA U & OSAKA U – Y Iwata, T Ohmoto, T Ohsugi, R Takashima, N Tamura

ILLINOIS U, URBANA – L Christafek, D Errede, S M Errede, L E Holloway, R M Keup, B Kharadia, T Liss, A J Martin, R M Roser

IPP, CANADA & MCGILL U & TORONTO U – B Hinrichsen, A Holscher, H S Kim, K Kordas, K Ragan, G Sganos, P Sinervo, K Strahl, W J Taylor, W Trischuk, A Warburton, Y Ye

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ROCHESTER U – S Blusk, A Bodek, H S Budd, J Cassada, P de Barbaro, Q Fan, B Kim, P Koehn, M Kruse, J Liu, M Pillai, W K Sakumoto, P Tipton, K Tollefson

ROCKEFELLER U – A Akopian, G Apollinari, S Bagdasarov, A Bhatti, L Demortier, N D Giokaris, K Goulianos, D Khazins, A Maghakian, P Melese, C Mesropian, A Titov

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TAIWAN, INST PHYS – P Chang, P Chang, H Y Chao, M-T Cheng, C-N Chiou, R Guo, Y-C Liu, A Soumarokov, P K Teng, C-H Wang, M-J Wang, P Yeh

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TEXAS TECH – D Benjamin, M Frautschi, O Ganel, W Hao, Q Liu, V Papadimitriou, A Sill, R Wigmans

TSUKUBA U – S Aota, T Asakawa, T Chikamatsu, S' Funaki, K Hara, E Hayashi, H Ikeda, T Ino, T Kaneko, S Kim, K Kondo, T Kuwabara, H Minato, H Mitsushio, S Miyashita, H Nakada, I Nakano, M Ninomiya, S Ogawa, R Oishi, M Okabe, H Sato, Y Seiya, M Shimojima, J- Suzuki, T Takada, M Takano, T Takano, K Takikawa, T Uchida, N Uemura, K Yasuoka, M Yokoyama

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Accelerator FNAL-COLLIDER *Detector* CDF

Reactions

$\bar{p}\,p$ 500–2000 GeV (E_{cm})

Particles studied W^+, W^-, Z^0, higgs, top

Brief description The first physics results were obtained during 1987, in an engineering run, and in 1988/89, in a year-long run. Upgrades for the 1991 run are described in the FNAL-775 proposal, and another major improvement was proposed for the 1993 run. CDF is a general-purpose detector designed to study the physics of $p\bar{p}$ collisions. It has both azimuthal and forward–backward symmetry. A superconducting solenoid of length 4.8 m and radius 1.5 m generates a 1.4 T magnetic field and contains tracking chambers used to detect charged particles and measure their momenta. Surrounding the solenoid are sampling calorimeters used to measure the electromagnetic and hadronic energy of jets and electrons. Outside the calorimeters are drift chambers used for muon detection. Surrounding the beam pipe is a 4-layer silicon microstrip vertex detector, and a vertex drift chamber, both installed in 1992. The Collider run ended in Spring 96 with a total luminosity of 110 pb^{-1} recorded on tape. The detector will be upgraded with new tracking, vertex detector, scintillating tile plug calorimeter, readout and trigger electronics, and extended muon coverage for the next Collider run with the Main Injector, now scheduled for April, 1999. Upgrade in progress (July 96).

Journal papers NIM 204 (1983) 351, NIM 204 (1983) 361, NIM 205 (1983) 113, NIM 216 (1983) 127, NIM A219 (1984) 472, JdeP 45 (1984) 333, NIM A238 (1985) 18, IEEE TNS 34 (1987) 865, NIM A263 (1988) 199, NIM A267 (1988) 249, NIM A267 (1988) 257, NIM A267 (1988) 272, NIM A267 (1988) 280, NIM A267 (1988) 301, NIM A267 (1988) 315, NIM A267 (1988) 330, NIM A267 (1988) 351, NIM A268 (1988) 24, NIM A268 (1988) 33, NIM A268 (1988) 41, NIM A268 (1988) 46, NIM A268 (1988) 50, NIM A268 (1988) 75, NIM A268 (1988) 92, NIM A269 (1988) 33, NIM A269 (1988) 40, NIM A269 (1988) 51, NIM A269 (1988) 63, NIM A269 (1988) 68, NIM A269 (1988) 82, NIM A269 (1988) 93, NIM A271 (1988) 387, PRL 61 (1988) 1819, PRL 62 (1989) 613, PRL 62 (1989) 1005, PRL 62 (1989) 1825, PRL 62 (1989) 3020, PRL 63 (1989) 720, PRL 63 (1989) 1447, NIM A274 (1989) 443, NIM A281 (1989) 485, PR D40 (1989) 3791, NP A498 (1989) 193c, IEEE TNS 36 (1989) 35, IEEE TNS 36 (1989) 347, IEEE TNS 36 (1989) 440, IEEE TNS 36 (1989) 765, NP (PROC SUPPL) 12 (1990) 18, NP (PROC SUPPL) 12 (1990) 254, PRL 64 (1990) 142, PRL 64 (1990) 147, PRL 64 (1990) 152, PRL 64 (1990) 157, PRL 64 (1990) 348, PRL 65 (1990) 968, PRL 65 (1990) 2243, PR D41 (1990) 1717, PR D41 (1990) 1722, PR D41 (1990) 2330, PRL 66 (1991) 2951, PRL 67 (1991) 1502, PRL 67 (1991) 2418, PRL 67 (1991) 2609, PRL 67 (1991) 2937, PRL 67 (1991) 3351, PR D43 (1991) 664, PR D43 (1991) 2070, PR D44 (1991) 29, PR D44 (1991) 601, NIM A315 (1992) 125, NP (PROC SUPPL) 25B (1992) 19, NP (PROC SUPPL) 27 (1992) 240, NP (PROC SUPPL) 27 (1992) 246, MPL A7 (1992) 2659, PRL 68 (1992) 447, PRL 68 (1992) 1458, PRL 68 (1992) 1463, PRL 68 (1992) 2734, PRL 68

(1992) 3398, PRL 68 (1992) 3403, PRL 69 (1992) 28, PRL 69 (1992) 2160, PRL 69 (1992) 2896, PRL 69 (1992) 3439, PRL 69 (1992) 3704, PR D45 (1992) 1448, PR D45 (1992) 2249, PR D45 (1992) 3921, PR D46 (1992) 1889, NIM A331 (1993) 57, NIM A333 (1993) 209, NP (PROC SUPPL) 31 (1993) 189, PRL 70 (1993) 713, PRL 70 (1993) 1376, PRL 70 (1993) 2232, PRL 70 (1993) 4042, PRL 71 (1993) 500, PRL 71 (1993) 679, PRL 71 (1993) 1685, PRL 71 (1993) 2396, PRL 71 (1993) 2537, PRL 71 (1993) 2542, PRL 71 (1993) 3421, PR D47 (1993) 2639, PR D47 (1993) 4857, PR D48 (1993) 998, PR D48 (1993) 2998, PR D48 (1993) 3939, NIM A350 (1994) 73, NIM A351 (1994) 59, NIM A351 (1994) 68, PRL 72 (1994) 1977, PRL 72 (1994) 3004, PRL 72 (1994) 3456, PRL 73 (1994) 220, PRL 73 (1994) 225, PRL 73 (1994) 2296, PRL 73 (1994) 2662 [erratum: PRL 74 (1995) 1891], PRL 73 (1994) 2667, NC 107A (1994) 2085, PR D49 (1994) 1, PR D50 (1994) 2966, PR D50 (1994) 4252, PR D50 (1994) 5518, PR D50 (1994) 5535, PR D50 (1994) 5550, PR D50 (1994) 5562, NP (PROC SUPPL) 39BC (1995) 348, NP (PROC SUPPL) 44 (1995) 20, NIM A368 (1995) 90, PRL 74 (1995) 341, PRL 74 (1995) 850, PRL 74 (1995) 855, PRL 74 (1995) 1936, PRL 74 (1995) 1941, PRL 74 (1995) 2626, PRL 74 (1995) 2900, PRL 74 (1995) 3538, PRL 74 (1995) 4988, PRL 75 (1995) 11, PRL 75 (1995) 608, PRL 75 (1995) 613, PRL 75 (1995) 1012, PRL 75 (1995) 1017, PRL 75 (1995) 1451, PRL 75 (1995) 3068, PRL 75 (1995) 3997, PRL 75 (1995) 4358, PR D51 (1995) 949, PR D51 (1995) 4623, PR D52 (1995) 2605, PR D52 (1995) 2624, PR D52 (1995) 4784, IJMP A11 (1996) 2045, IJMP A11 (1996) 2233, PRL 76 (1996) 2006, PRL 76 (1996) 2015, PRL 76 (1996) 2852, PRL 76 (1996) 3070, PRL 76 (1996) 4307, PRL 76 (1996) 4462, PRL 76 (1996) 4675, PR D53 (1996) 1051, and PR D53 (1996) 3496.

Related experiments FNAL-775, FNAL-830, FNAL-876

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FNAL-760

(Proposed Mar 1985, Approved Jun 1985, Began data-taking 1990, Completed data-taking Jan 1992)

INVESTIGATION OF THE FORMATION OF CHARMONIUM STATES USING THE $\bar{p}$ ACCUMULATOR RING

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Accelerator FNAL *Detector* Tracking system, Calorimeter

Reactions

$\bar{p}\ p \rightarrow$ charm $\overline{\text{charm}}$	3–7 GeV/c
$\bar{p}\ p \rightarrow e^+\ e^-$	"
$\bar{p}\ p \rightarrow \gamma$'s	"
$\bar{p}\ p \rightarrow \bar{p}\ p$	"

Particles studied charmonium

Brief description Studies charmonium states formed exclusively in $\bar{p}p$ collisions, and their decays to electromagnetic final states. Uses a gas jet hydrogen target in the Fermilab $\bar{p}$ source. The detector consists of a tracking system, hodoscopes, and Čerenkov counters surrounded by a central lead glass electromagnetic calorimeter, and a planar forward calorimeter. Data analysis completed.

Journal papers NIM A271 (1988) 417, NIM A277 (1989) 116, NIM A295 (1990) 73, NIM A301 (1991) 47, NIM A307 (1991) 254, NIM A317 (1992) 135, SJNP 55 (1992) 792, SJNP 55 (1992) 811, SJNP 55 (1992) 865, PRL 68 (1992) 1468, PRL 69 (1992) 2337, NP B373 (1992) 35, PL B307 (1993) 394, PL B307 (1993) 399, PRL 70 (1993) 1212, PRL 70 (1993) 2983, NP A558 (1993) 259c, PR D47 (1993) 772, PR D48 (1993) 3037, NC 107A (1994) 2013, PAN 57 (1994) 1513 = YF 57 (1994) 1587, PAN 57 (1994) 1722 = YF 57 (1994) 1793, NIM A355 (1995) 308, and PR D52 (1995) 4839.

Related experiments FNAL-835

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WWW Home-page http://www-e835.fnal.gov/

FNAL-771

(Proposed Feb 1986, Approved Apr 1987, Began data-taking 1991, Completed data-taking Jan 1992)

BEAUTY PRODUCTION AND OTHER HEAVY QUARK PHYSICS ASSOCIATED WITH DIMUON PRODUCTION IN 800 (925) GeV/c p Si INTERACTIONS

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HOUSTON U – K H Lau, G H Mo
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LECCE U – P Creti, V Elia, E Gorini, F Grancagnolo, M Panareo
MCGILL U – J M Trischuk
NANJING U – T Y Chen, N G Yao
NORTHWESTERN U – M M Block
PAVIA U – L Antoniazzi, G Bonomi, G Introzzi, G Liguori, P Torre
PENN U – A J Blankman, W I Kononenko, W Selove
PRAIRIE VIEW A AND M – M L Haire, D J Judd, L Turnbull, D E Wagoner
SHINSHU U – M He, C H Shen, C Wang, C Wei, N Zhang
VANIER COLL – M S Cooper
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WISCONSIN U – T Alexopoulos, A R Erwin, J R Jennings

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

p Si $\rightarrow \mu^+\ \mu^-$ X	800 GeV/c
p Si $\rightarrow$ muon X	"
p Si $\rightarrow B\ \overline{B}$ X	"
p Si $\rightarrow J/\psi(1S)$ X	"
p Si $\rightarrow \chi_c$(unspec) X	"

Particles studied B^+, B^0, $J/\psi(1S)$, $\psi(2S)$, $\chi_{c1}(1P)$, χ_c(unspec)

Brief description Uses the FNAL-705 spectrometer augmented by a 10,000-channel silicon detector and a new single muon and dimuon trigger to select $B\overline{B}$ events at a high rate ($\sim 2 \times 10^6$/s). Data analysis in progress (July 96).

Journal papers NP (PROC SUPPL) 23B (1991) 249, NIM A314 (1992) 563, NIM A315 (1992) 92, NIM A333 (1993) 142, NIM A337 (1993) 350, NIM A340 (1994) 491, NIM A355 (1995) 320, NIM A360 (1995) 334, PL B374 (1996) 271, and PRL 77 (1996) (in press).

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WWW Home-page
http://fermi.clas.virginia.edu/~aal2q/e771/e771hp.html

SUMMARIES OF FERMILAB EXPERIMENTS

FNAL-773

(Proposed Mar 1986, Approved Jul 1986, Jun 1989, Began data-taking Jul 1991, Completed data-taking Sep 1991)

MEASUREMENT OF THE PHASE DIFFERENCE BETWEEN η_{00} AND η_{+-} TO A PRECISION OF 0.5°

CHICAGO U – A R Barker, R A Briere, E Cheu, L K Gibbons, D Harris, G D Makoff, K S Mcfarland, A Roodman, B Schwingenheuer, Y W Wah, B D Winstein, R Winston
ELMHURST COLL – E C Swallow
FERMILAB – G J Bock, R N Coleman, M Crisler, J Enagonio, R Ford, Y B Hsiung, D Jensen, E Ramberg, R S Tschirhart, T Yamanaka
ILLINOIS U, URBANA – E Collins, G D Gollin (√ Spokesperson)
RUTGERS U – P Gu, P Haas, W P Hogan, S K Kim, J N Matthews, S S Myung, S R Schnetzer, S V Somalwar, G B Thomson, Y Zou

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

$K_L \to \pi^+ \pi^-$	50–150 GeV/c
$K_L \to \pi^+ \pi^- \gamma$	"
$K_L \to \pi^0 \pi^0$	"
$K_S \to \pi^+ \pi^-$	"
$K_S \to \pi^+ \pi^- \gamma$	"
$K_S \to \pi^0 \pi^0$	"

Particles studied K_L, K_S

Brief description This experiment adds an additional regenerator to the FNAL-731 spectrometer. A double K_L beam is incident on the spectrometer, which has 804 lead glass blocks and four drift chambers. One beam passes through a thin regenerator at the start of the fiducial decay volume, the other traverses a thick regenerator 11 meters further upstream. The regenerators switch beams between machine pulses. Neutral beam is produced by 800 GeV protons on a 36-cm beryllium target. The experiment tests CPT invariance. Data analysis completed (July 96).

Journal papers PRL 74 (1995) 4376, and PRL 75 (1995) 2803.

Related experiments FNAL-731, FNAL-799

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FNAL-781

(Proposed Mar 1987, Approved Oct 1988, In preparation)

SEGMENTED LARGE-X BARYON SPECTROMETER (SELEX)

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BOGAZICI U – E Gulmez
BRISTOL U – V J Smith
CARNEGIE MELLON U – R M Edelstein, D Gibaut, E E Gottschalk, A Kushnirenko, D Mao, P Mathew, M Mattson, D M Potter, M P Procario, J S Russ (Spokesperson), S Yang
RIO DE JANEIRO, CBPF – E C De Oliveira, A M F Endler, L C S Oliveira, M C Pommot Maia
FERMILAB – P S Cooper (Spokesperson), J Engelfried, J R Kilmer, S Kwan, J Lach, G A Oleynik, E J Ramberg, D D Skow, L G Stutte
HAWAII U – C J Kenney, S I Parker
IOWA U – N Akchurin, M Aykac, K R Barger, M Kaya, U Mallik, E R Mccliment, J M Mcpherson, K D Nelson, C R Newsom, Y Onel, E Ozel, S Ozkorucuklu, L Pasquali
MUNICH, MAX PLANCK INST – U Dersch, I Eschrich, K Koenigsmann, I Konorov, H Krueger, S Masciocchi, S M Paul, B Povh, J Simon, K Vorwalter, R Werding
MOSCOW STATE U – I Filimonov, E M Leikin, A Nemitkin, V Rud
MOSCOW, ITEP – M Balats, G Davidenko, A Dolgolenko, G Dzyubenko, V Evdokimov, P A Goritchev, V M Guzhavin, A Kamenski, V D Khovansky, M A Kubantsev, V S Lakaev, V Matveyev, A P Nilov, V A Prutskoi, V K Semyachkin, A L Sitnikov, V Verebryusov, V E Vishnyakov
PARAIBA U – M Luksys
ST PETERSBURG, INP – A Atamantchouk, N Bondar, A S Denisov, A Goliach, V L Golovtsov, V T Gratchev, A V Khanzadeev, V T Kim, L M Kotchenda, A G Krivshich, N P Kuropatkin, V Maleev, P V Neustroev, V M Samsonov, V A Schegelsky, N N Smirnov, V L Stepanov, M Svoiski, N K Terentiev, L N Uvarov, A P Vorobiev
SERPUKHOV – R Elochin, Y Goncharenko, O A Grachov, V Koubarovski, A Kozhevnikov, N Kulyavtzev, V F Kurshetsov, L G Landsberg, V Moltchanov, B A Mukhin, V Mukhin, S B (S) Nurushev, A N Vasiliev, D V Vavilov, V A Victorov
ROCHESTER U – T Ferbel, G E Ginther, Jr , C Hammer, P F Slattery, M Zielinski
INFN, ROME – M Iori
SAN LUIS POTOSI U – A M Morelos-Pineda
SAO PAULO U – O P Eboli, L Emediato, C O Escobar, F Garcia, P Gouffon, T Lungov, R Soares, R Zukanovich-Funchal
TEL AVIV U – S Gerson, J Grunhaus, S Kananov, M A Moinester, A Ocherashvili, V Steiner
INFN, TRIESTE – A Bravar, D Dreossi, A Lamberto, A Penzo, G F Rappazzo, P P Schiavon
WASHINGTON U, SEATTLE – V Chaloupka, T Zhao

Accelerator FNAL-TEV *Detector* Spectrometer

Particles studied charmed-baryon

Brief description Studies both charmed baryon production and decays. Trigger is based on impact parameter. The spectrometer deploys a number of existing detectors as well as the new silicon strip and pixel devices and a ring imaging Čerenkov counter. Being installed (May 96).

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FNAL-789

(Proposed Nov 1987, Approved Oct 1988, Began data-taking 1990, Completed data-taking Jan 1992)

MEASUREMENT OF THE PRODUCTION AND DECAY INTO TWO-BODY MODES OF b-QUARK MESONS AND BARYONS

ABILENE CHRISTIAN U – L D Isenhower, M E Sadler, R G Schnathorst
TAIWAN, INST PHYS – Y C Chen, G C Kiang, P K Teng
CHICAGO U – L M Lederman, M H Schub
FERMILAB – C N Brown, W E Cooper, H D Glass, K N Gounder, C S Mishra
LBL – G Gidal, P M Ho, M S Kowitt, K B Luk, D Pripstein
LOS ALAMOS – T A Carey, D M Jansen, R G Jeppesen, J S Kapustinsky, D W Lane, M J Leitch, J W Lillberg, P L McGaughey, J M Moss, J C Peng (√ Spokesperson)
NORTHERN ILLINOIS U – D M Kaplan (√ Spokesperson), W R Luebke, V M Martin, R S Preston, J J Sa, V Tanikella
SOUTH CAROLINA U – R L Childers, C W Darden, J R Wilson

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

p nucleus	800 GeV/c (P_{lab})

Particles studied bottom, charm

Brief description Studies low multiplicity decays of b- and c-quark hadrons. Essential to evaluating the suitability of dihadronic beauty decays for the study of CP violation in the B system. Sensitive also to dileptonic modes, allowing limits to be set on their branching ratios. Uses the existing FNAL-605/772 spectrometer with suitably upgraded trigger processor system. Data analysis in progress (July 96).

Journal papers IEEE TNS 38 (1991) 461, IEEE TNS 39 (1992) 758, NP A544 (1992) 197c, PRL 72 (1994) 1318, PRL 72 (1994) 2542, PR D50 (1994) 9, PRL 74 (1995) 3118, PR D52 (1995) 1307, and PR D52 (1995) 4251.

Related experiments FNAL-771, DESY-HERA-B

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WWW Home-page http://p2hp2.lanl.gov/e789/e789.html

FNAL-791

(Proposed Nov 1987, Approved Jun 1988, Began data-taking 1991, Completed data-taking Jan 1992)

HADROPRODUCTION OF HEAVY FLAVORS AT THE TAGGED PHOTON LABORATORY

E791 COLLABORATION

RIO DE JANEIRO, CBPF – S F Amato, I Bediaga, I Costa, J M De Miranda, J C Dos Anjos, J Mello, Neto , H Motta, Filho , A Reis, A Santoro, J Solano, M H G Souza
UC, SANTA CRUZ – G Blaylock, P Gagnon, J Leslie, K O'Shaughnessy, K Sugano
CINCINNATI U – S Devmal, B Meadows, L P Perera, A K Santha, M D Sokoloff
FERMILAB – J A Appel (√ Spokesperson), S Banerjee, S B Bracker, T G Carter, L Chen-Tokarek, K Denisenko, A M Halling, C C James, S Kwan, B G Lundberg, K A Thorne
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KANSAS STATE U – M Aryal, A Nguyen, N W Reay, R A Sidwell, N R Stanton, A Tripathi, N Witchey, S Yoshida, C Zhang
MEXICO, IPN – A Gago, G Herrera-Corral
MISSISSIPPI U – E M Aitala, L M Cremaldi, K N Gounder, A Rafatian, J J Reidy, D J Summers, D Y Yi
OHIO STATE U – K Reibel
PRINCETON U – D Langs, A Schwartz, J Wiener
PUEBLA U, MEXICO – E Cantoral, A B D'Oliveira, A Fernandez
RIO DE JANEIRO U – H D S Carvalho, A J Ramalho
SOUTH CAROLINA U – N Copty, M V Purohit (√ Spokesperson)
STANFORD U – P R Burchat, R Zaliznyak
TEL AVIV U – D Ashery, S Gerzon, G Hurvits, J Lichtenstadt, S MayTal-Beck, R Weiss-Babai
TUFTS U – R H Milburn, A Napier
WISCONSIN U – S A Radeztsky, M C Sheaff, K Stenson, S Watanabe
YALE U – C L Darling, A J Slaughter, S F Takach, E J Wolin

Accelerator FNAL-TEV *Detector* TPS

Reactions

π^- nucleus → charm X	500 GeV (E_{lab})
π^- nucleus → bottom X	"

Particles studied charm, bottom

Brief description Continues studies of FNAL-769. Emphasizes charm physics and a first look at bottom hadroproduction. Targets are Pt, and C foils. Some 20 billion events are collected. More than 200,000 charm decays are fully reconstructed. Data analysis in progress (July 96).

Journal papers NIM A324 (1993) 535, PL B371 (1996) 157, PL B379 (1996) 292, and PRL 76 (1996) 364. More publications expected.

Related experiments FNAL-653, FNAL-687, FNAL-691, FNAL-769, CERN-WA-082, CERN-WA-089

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WWW Home-page
http://fnphyx-www.fnal.gov/experiments/e791/welcome.html

FNAL-799

(Proposed Jan 1989, Approved Jun 1989, Began data-taking Oct 1991, In progress)

SEARCH FOR THE DECAY $K_L \to \pi^0 e^+ e^-$

UCLA – K Arisaka, D Chen, S M Field, J R Jennings, J Kubic, D Roberts, W E Slater, M Weaver
UC, SAN DIEGO – H G E Kobrak, E Potter, R A Swanson, G A White
CHICAGO U – E C Blucher, G C Bown, R A Briere, S Bright, E Cheu, G E Graham, J Graham, D Harris, R S Kessler, G D Makoff, K Mcfarland, V Prasad, G B Quinn, A J Roodman, B Schwingenheuer, P S Shawhan, N Solomey, Y W Wah (√ Spokesperson), B D Winstein, R Winston, E D Zimmerman
COLORADO U – A R Barker, D Fillmore, P L Mikelsons, U Nauenberg, J-Y Wu
ELMHURST COLL – E C Swallow
FERMILAB – R Ben-David, G J Bock, S R Childress, R N Coleman, M B Crisler, J Enagonio, R L Ford, Y B Hsiung, D A Jensen, T Kobilarcik, H Nguyen, V O'Dell, R Pordes, S A Pordes, D R Pushka, E J Ramberg, R E Ray, Jr , A I Ronzhin, K C Stanfield, R S Tschirhart, K Vaziri, H B White, J Whitmore
ILLINOIS U, URBANA – E Collins, G D Gollin
OSAKA U – K Hanagaki, M Hazumi, T Hazumi, S Hidaka, F Kato, T Nakaya, M Sadamoto, M Sogo, M Yagi, T Yamanaka (√ Spokesperson)
RICE U – J Barnes, Ii , M D Corcoran, B P Padley
RUTGERS U – I F M Albuquerque, J W Belz, P M Haas, E Halkiadakis, W P Hogan, S K Kim, A Lath, J N Matthews, S S Myung, G Ping, S R Schnetzer, S V Somalwar, R L Stone, R Tesarek, G B Thomson, Y Zou
VIRGINIA U – M W Arenton, B B Cox, H Duan, K Hagan-Ingram, V Jejer, S Ledovskoy, A P Mcmanus, K S Nelson
WISCONSIN U – A Alavi-Harati, T Alexopoulos, A R Erwin

Accelerator FNAL-TEV *Detector* Spectrometer, Calorimeter

Reactions

p nucleon → Λ X	800 GeV/c
p nucleon → $\overline{\Lambda}$ X	"
$K_L \to \pi^0 e^+ e^-$	50–150 GeV/c
$K_L \to \pi^0 \mu^+ \mu^-$	"
$K_L \to \pi^0 \nu_e \bar{\nu}_e$	"
$K_L \to e^+ e^- e^+ e^-$	"
$K_L \to e^+ e^- \gamma\gamma$	"
$K_L \to \mu^+ \mu^- \gamma$	"
$K_L \to \pi^0 \pi^0 \gamma$	"
$\pi^0 \to e^+ e^-$	"
$\pi^0 \to e^+ \mu^-$	"
$\pi^0 \to e^- \mu^+$	"

Particles studied K_L, π^0, Λ

Brief description The goal is to use rare K_L decays as a probe for the CP violation. Phase-I modifies the existing apparatus of FNAL-731 to handle increased K_L flux and an extended decay region, and to provide a better muon identification. Studies various multibody rare K_L decays, and π^0 decays. Phase-I completed data taking in January 92. Phase-II uses a new beamline and a new detector including a new CsI calorimeter to improve the rejection of $K_L \to e^+e^-\gamma\gamma$ background from the $K_L \to \pi^0 e^+ e^-$ signal. It also uses a new transition radiation detector (TRD) to achieve a better π/e rejection. The sensitivity is expected to approach the 10^{-11} level for many rare K_L decays. See also the closely related FNAL-832 experiment. Phase-II is now taking data (July 96).

Journal papers PRL 71 (1993) 31, PRL 71 (1993) 3914, PRL 71 (1993) 3918, PL B320 (1994) 407, PL B338 (1994) 403, PRL 72 (1994) 3000, PRL 72 (1994) 3758, PRL 73 (1994) 2169, PR D50 (1994) 1874, and PRL 74 (1995) 3323.

Related experiments FNAL-731, FNAL-773, FNAL-832

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FNAL-800

(Proposed Mar 1988, Approved Oct 1988, Completed data-taking Jan 1992)

MEASUREMENT OF THE MAGNETIC MOMENT OF THE Ω^- HYPERON

ARIZONA U – D K Fein, E B James, K A Johns (Spokesperson)
DEPAUW U – V A Decarlo, P M Tynan
FERMILAB – G Allan, R A Rameika (Spokesperson)
MICHIGAN U – Y T Gao, M J Longo
MINNESOTA U – J A Ayala-Mercado, P M Border, D P Ciampa, G M Guglielmo, K J Heller, J Jalilian-Marian, N B Wallace, D M Woods

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

p Be $\rightarrow \Omega^-$ X	800 GeV/c
Λ Cu $\rightarrow \Omega^-$ X	300–500 GeV/c
Λ Cu $\rightarrow \Xi^-$ X	"
Ξ^0 Cu $\rightarrow \Omega^-$ X	"
Ξ^0 Cu $\rightarrow \Xi^-$ X	"

Particles studied Ω^-, Ξ^-

Brief description An extension of FNAL-756. Uses two methods to produce polarized Ω's. The spin transfer method uses 800-GeV protons to produce a secondary neutral beam of polarized Λ's and Ξ^0's, which is then used to produce a tertiary beam of polarized Ω's at 0 mr. The neutral production method uses a secondary beam of unpolarized Λ's and Ξ^0's incident at a production angle to produce polarized Ω's. The spectrometer consists of a set of silicon strip detectors and a set of multiwire proportional chambers.

Journal papers PRL 74 (1985) 3732.

Related experiments FNAL-756

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FNAL-803

(Proposed 1990, 1993, Approved Nov 1993, In preparation)

ν_μ TO ν_τ OSCILLATIONS

COSMOS COLLABORATION
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ATHENS U – G S Tzanakos
UC, DAVIS – V Paolone, P M Yager
CHANGWON NATIONAL U – C H Hahn
CHONNAM NATIONAL U – J Y Kim
COLUMBIA U – J M Conrad, M H Shaevitz, E G Stern
FERMILAB – V D Bogert, T G Carter, G M Koizumi, B G Lundberg, A J Malensek, J G Morfin, R A Rameika
GIFU U – K Nakazawa, S Tasaka
GYEONGSANG NATIONAL U – I G Park, J S Song
HIROSAKI U – S Kuramata
ILLINOIS TECH – R A Burnstein, H A Rubin
INDIANA U – C Bower, R M Heinz, L Miller, S Mufson, J Musser
KANSAS STATE U – T A Bolton, S McPeek, D L Naples, N W Reay (√ Spokesperson), R A Sidwell, E Smith, N R Stanton, D M Woods, S Yoshida
KINKI U, OSAKA – M Chikawa
KOBE U – S Aoki, T Hara
KOREA INST SCI – J K Kim
KOREA U – J S Kang, C O Kim
MICHIGAN U – R C Ball, S Coutu, K Green, D Levin, J Matthews, S McKee, D F Nitz, S Nutter, J K Riles, B P Roe, G Tarle, R P Thun, J C Vander Velde, C Weaverdyck
MINNESOTA U – J K Nelson, R W Rusack, V M Singh
MOSCOW, ITEP – A Asratyan, M Balats, G Davidenko, A Dolgolenko, G Dzyubenko, A Evdokimov, A Gerasimov, V S Kaftanov, M A Kubantsev, V K Semyachkin, A L Sitnikov, V Verebryusov, V E Vishnyakov
NAGOYA INST TECH – Y Isokane, Y Tsuneoka
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OKAYAMA U – K Moriyama, H Shibata
OSAKA CITY U – T Okusawa, M Teranaka, T Tominaga, T Watanabe, T Yoshida
OSAKA PREFECTURE U – H Okabe, J Yokota
OSAKA U OF COMMERCE – G Fujioka, Y Takahashi
SEOUL NATIONAL U – J W Kim
SOAI U – O Kusumoto
SOUTH CAROLINA U – F T Avignone, A Kulik, C Rosenfeld
TECHNION – J Goldberg
TOHO U – M Adachi, M Kazuno, Y Kobayashi, E Niu, S Ono, H Shibuya, Y Umezawa
TUFTS U – T Kafka, A Napier, W P Oliver, J Schneps
UCLA – M Atac, D B Cline, W Hong, J Park, J M Rhoades, J K Woo
UTSUNOMIYA U – Y Sato, I Tezuka
YOKOHAMA NATIONAL U – Y Maeda

Accelerator FNAL *Detector* Emulsion, Spectrometer

Reactions

ν_τ nucleon $\rightarrow \tau$ X	—

Particles studied ν_μ, ν_τ

Brief description This is a short-baseline neutrino oscillation experiment which searches for the $\nu_\mu \rightarrow \nu_\tau$, $\nu_e \rightarrow \nu_\tau$, and $\nu_\mu \rightarrow \nu_e$ transitions. Uses the COSMOS detector, a hybrid emulsion – electronic spectrometer sensitive to ultra-small mixing angles for neutrino mass differences in the range larger than 0.1 eV^2. Resides on a wide band, 10–70 GeV, neutrino beam from Fermilab's new Main Injector. In preparation (July 96).

Related experiments FNAL-531, CERN-WA-095, CERN-WA-096

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WWW Home-page
http://roo.physics.lsa.umich.edu/www/e803/e803.html

FNAL-811

(Proposed Mar 1991, Approved Jul 1992, Began data-taking Jan 1996, Completed data-taking Feb 1996)

$\bar{p}p$ ELASTIC SCATTERING

CERN – R DeSalvo, M R Mondardini
CORNELL U – C Avila, C M Guss, J Orear (√ Spokesperson)
FERMILAB – W F Baker, D P Eartly, H Jostlein, S M Pruss, R Rubinstein, F Turkot

Accelerator FNAL-COLLIDER *Detector* Scintillator

Reactions

$\bar{p}\ p \rightarrow \bar{p}\ p$	1800 GeV (E_{cm})

Brief description The detector is a solid bundle of scintillating fibers. The fibers are parallel to the beam, inside the beam pipe. Can be remotely moved close to the beam. Measures x and y coordinates of scattered protons to 50-micron accuracy. Scattering angles are small enough to observe Coulomb interference and to use the optical theorem to get total cross-section. Data analysis in progress (July 96).

Journal papers NIM A323 (1992) 419, NP (PROC SUPPL) 25B (1992) 261, and NP (PROC SUPPL) 25B (1992) 294.

Related experiments FNAL-710

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FNAL-815

(Proposed Oct 1990, Approved Jul 1992, Began data-taking May 1996, In progress)

PRECISION MEASUREMENTS OF NEUTRINO NEUTRAL CURRENT INTERACTIONS USING A SIGN-SELECTED BEAM

NUTEV COLLABORATION
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CINCINNATI U – R Johnson, L P Perera, G W Troha, M Vakili
COLUMBIA U – J M Conrad, R Gall, J H Kim, S Koutsoliotas, S Lammers, C McNulty, A Romosan, P C Rowson, M H Shaevitz (√ Spokesperson), P Spentzouris, E G Stern, A Vaitaitis
FERMILAB – R H Bernstein (√ Spokesperson), L Bugel, G Koizumi, M J Lamm, W L Marsh, K S McFarland, J Yu
KANSAS STATE U – T A Bolton, J Goldman, S McPeek, D L Naples, J Norris
NORTHWESTERN U – D A Buchholz, L Debarbaro, H M Schellman, G Zeller
OREGON U – J E Brau, R B Drucker, R E Frey, D Mason
ROCHESTER U – P S Auchincloss, S Avvakumov, A Bodek, H S Budd, P Debarbaro, D Harris, W K Sakumoto, U K Yang
XAVIER U – P Nienaber

Accelerator FNAL-TEV *Detector* LAB-E

Reactions

$\nu\ n \rightarrow \mu^-\ X$	250 GeV (E_{lab})
$\nu\ n \rightarrow \nu\ X$	"

Particles studied ν

Brief description The primary physics goal is to measure $\sin^2\theta_W$ to a precision of $\pm(0.002$–$0.003)$. The high precision is achieved by making use of a new high-intensity sign-selected neutrino beam. The new beam design permits clean separation of ν from $\overline{\nu}$ while providing enough intensity to maintain small statistical errors. Other goals include the study of the QCD scale parameter Λ, the charm mass, the CKM matrix element V_{cd}, and the effects of the strange quark sea and charm quark sea on proton. Approved for a two-year run. Taking data (July 96).

Related experiments FNAL-744, FNAL-770

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WWW Home-page http://cordelia.fnal.gov/NuTeV.html

FNAL-831

(Proposed Oct 1990, Approved Dec 1992, In preparation)

HIGH STATISTICS STUDY OF STATES CONTAINING HEAVY QUARKS USING THE WIDE BAND PHOTON BEAM

FOCUS COLLABORATION

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MEXICO, IPN – S Carrillo, E Casimiro, G Herrera-Corral, H Mendez, C Uribe
COLORADO U – L Cinquini, J P Cumalat (√ Spokesperson), E S Erdos, B O'Reilly, E Vaandering
FERMILAB – J N Butler, H W K Cheung, S Cihangir, I Gaines, P H Garbincius, L A Garren, S A Gourlay, D J Harding, P H Kasper, A E Kreymer, P L G Lebrun, S Shukla
FRASCATI – S Bianco, F Fabbri, M Giardoni, L Passamonti, V Russo, S Sarwar, A Zallo
ILLINOIS U, URBANA – C Cawlfield, F D Cogswell, R Gardner, K S Park, L Peak, A M Rahimi, J E Wiss
KOREA U – B G Cheon, Y S Chung, J S Kang, K Y Kim, K B Lee, S S Myung
INFN, MILAN – M Boschini, P D'Angelo, P Inzani, S Malvezzi, D Menasce, E Meroni, L Moroni (√ Spokesperson), D Pedrini, L Perasso, F P Prelz, A Sala-Grabar, S Sala
MILAN U – G Alimonti, G Bellini, B Caccianiga, M Dicorato, P Dini, M G Giammarchi, F Leveraro, L Milazzo
NORTH CAROLINA U – T F Davenport, III
NOTRE DAME U – J M Bishop, N M Cason, J M Losecco, W D Shephard
PAVIA U – V Arena, O Barnaba, G Boca, G Bonomi, S Bricola, C Casella, E D'Uscio, G Gianini, E Imbres, G Juvino, G Liquori, T Locatelli, M Marchesotti, S P Ratti, C M Riccardi, P Torre, F Vercellati, L Viola, P Vitulo
PUEBLA U, MEXICO – E Cantoral, A Fernandez, S Hernandez, G Munoz, J Ramirez
PUERTO RICO U, MAYAGUEZ – J Alemar, A M Lopez, L Mendez, A Mirles, E Montiel, H Mourad, J Ramirez, C Rivera, W Rolke, Y L Zhang
SOUTH CAROLINA U – N Copty, W Johns, M V Purohit, J R Wilson
TENNESSEE U – G T Condo, K Danyo-Blackett, T Handler
VANDERBILT U – J W Cao, M Hosack, M Nehring, P D Sheldon, M S Webster
WISCONSIN U – M C Sheaff, K Stenson

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

γ nucleus $\rightarrow$ charm meson X	< 250 GeV/c (P_{lab})
γ nucleus $\rightarrow$ charm baryon X	"

Particles studied ψ(unspec), charm

Brief description Continues studies of FNAL-687. Uses bremsstrahlung photons from a wide band 250 GeV ($\pm$15%) electron beam, a new large-aperture multiparticle spectrometer, a beryllium target, and a silicon microstrip decay-vertex detector. Studies the photoproduction and decay of heavy quarks. Being installed (July 96).

Related experiments FNAL-687

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WWW Home-page http://da831.fnal.gov/

FNAL-832

(Proposed Oct 1990, Approved Jun 1992, Began data-taking Jul 1996, In progress)

SEARCH FOR DIRECT CP VIOLATION IN THE 2π DECAYS OF THE NEUTRAL KAON

KTEV COLLABORATION

UCLA – K Arisaka, S M Field, J R Jennings, J Kubic, W E Slater
UC, SAN DIEGO – H G E Kobrak, E Potter, R A Swanson, G A White
CHICAGO U – E C Blucher, G C Bown, S Bright, E Cheu, G E Graham, J Graham, R S Kessler, V Prasad, G B Quinn, A J Roodman, P S Shawhan, N Solomey, Y W Wah, B D Winstein (√ Spokesperson), R Winston, E D Zimmerman
COLORADO U – A R Barker, D Fillmore, P L Mikelsons, U Nauenberg, J Y Wu
ELMHURST COLL – E C Swallow
FERMILAB – L Bellantoni, R Ben-David, G J Bock, S R Childress, R N Coleman, M B Crisler, R L Ford, Y B Hsiung (√ Spokesperson), D Jensen, T Kobilarcik, T Nakaya, H Nguyen, V O'Dell, M Pang, R Pordes, S A Pordes, D R Pushka, E J Ramberg, R E Ray, Jr , A I Ronzhin, P Shanahan, K C Stanfield, R S Tschirhart, K Vaziri, H B White, J Whitmore
OSAKA U – K Hanagaki, M Hazumi, T Hazumi, S Hidaka, F Kato, Y Matsumiya, M Sadamoto, M Sogo, M Takita, T Tsuji, M Yagi, T Yamanaka
RICE U – A Bellanvance, M D Corcoran, B P Padley
RUTGERS U – I F M Albuquerque, S Averitte, J W Belz, E Halkiadakis, A Lath, S R Schnetzer, S V Somalwar, R L Stone, R Tesarek, G B Thomson
VIRGINIA U – M W Arenton, B B Cox, K Hagan-Ingram, V Jejer, S Ledovskoy, A P Mcmanus, K S Nelson
WISCONSIN U – A Alavi-Harati, T Alexopoulos, A R Erwin

Accelerator FNAL-TEV *Detector* Spectrometer, Calorimeter

Reactions

$K_L \rightarrow \pi^+\ \pi^-$	30–160 GeV/c (P_{lab})
$K_L \rightarrow \pi^0\ \pi^0$	"
$K_L \rightarrow \pi^+\ \pi^-\ \gamma$	"
$K_L \rightarrow \pi^0\ \gamma\ \gamma$	"
$K_L \rightarrow \pi^0\ \nu\ \overline{\nu}$	"
$K_S \rightarrow \pi^+\ \pi^-$	"
$K_S \rightarrow \pi^0\ \pi^0$	"
$K_S \rightarrow \pi^+\ \pi^-\ \gamma$	"

Particles studied K_L, K_S

Brief description Measures the direct CP violation parameter $\mathrm{Re}(\epsilon'/\epsilon)$ to the precision of 10^{-4}. The new neutral kaon beam facility, KTeV, is constructed to give five times more flux, with reduced muon background and accidental rate. The apparatus gives twice as long a decay region, higher rate capability, and more hermetic photon veto coverage against the $3\pi^0$ background. The position and energy resolution of the electromagnetic calorimeter (CsI) for electron and photon are improved. Uses a beryllium target. Taking data (July 96).

Journal papers NIM A367 (1995) 252, and NIM A368 (1996) 653

Related experiments FNAL-731, –773, –799, CERN-NA-048

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WWW Home-page
http://fnphyx-www.fnal.gov/experiments/ktev/ktev.html

FNAL-835

(Proposed 1992, Approved Dec 1993, In preparation)

STUDY OF CHARMONIUM SPECTROSCOPY IN PROTON–ANTIPROTON ANNIHILATION

CHARMONIUM COLLABORATION
UC, IRVINE – K E Gollwitzer, M A Mandelkern, J Schultz, M Thompson, G Zioulas
FERMILAB – M D Church, A A Hahn, W L Marsh, J Peoples, Jr , S A Pordes, P A Rapidis, J Streets, S Werkema
FERRARA U – M Ambrogiani, W Baldini, D Bettoni, M Bombanoti, D Bonsi, R Calabrese, P Dalpiaz, E Luppi, R Mussa, M Savrie, G Stancari
INFN, GENOA – A Buzzo, M Lovetere, M Macri, M M Marinelli, M Pallavicini, C Patrignani, M G Pia, E Robutti, A Santroni
NORTHWESTERN U – X L Fan, S Jin, P Maas, T K Pedlar, J L Rosen, K K Seth
TURIN U – G Borreani, R Cester (√ Spokesperson), F Marchetto, E A Menichetti, N M Pastrone

Accelerator FNAL *Detector* Tracking system, Calorimeter

Reactions

$\overline{p}\,p \rightarrow$ charm charm	3–7 GeV/c (P_{lab})
$\overline{p}\,p \rightarrow e^+\,e^-$	"
$\overline{p}\,p \rightarrow \gamma$'s	"
$\overline{p}\,p \rightarrow \overline{p}\,p$	"
$\overline{p}\,p \rightarrow \phi\,\phi$	"

Particles studied $\eta_c(1S)$, $\eta_c(2S)$, $h_c(1P)$, $\chi_{c0}(1P)$, D

Brief description Continues the program of the FNAL-760 experiment in order to complete the study of the masses, widths and branching fractions of charmonium states. Adds a search for cryptoexotics and a study of J/ψ formation in nuclear matter. Improvements in the apparatus include: increased density of the internal target, better charged particle detection, an upgrade in the central calorimetry and a new data acquisition architecture. This is an Accumulator Ring experiment. Being installed (July 96).

Related experiments FNAL-760

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WWW Home-page http://www-e835.fnal.gov/

FNAL-866

(Proposed Sep 1992, Approved Dec 1992, In preparation)

MEASUREMENT OF THE RATIO OF ANTIQUARK DISTRIBUTIONS $\overline{d}(x)/\overline{u}(x)$ IN THE PROTON

NUSEA COLLABORATION
ABILENE CHRISTIAN U – L D Isenhower, M E Sadler, R S Towell, D Wise
ARGONNE – K G Bailey, D F Geesaman, H E Jackson, Jr , C Jones, S Kaufman, R Kowalczyk, N Makins, T O'Neill, D H Potterveld, J Reinhold, B Zeidman, A Zeuli
FERMILAB – C N Brown, W E Cooper, C S Mishra
GEORGIA STATE U – X C He, W M Lee, G Petitt
ILLINOIS TECH – D M Kaplan
LOS ALAMOS – M L Brooks, T A Carey, F Federspeil, G T Garvey, D M Jansen, D M Lee, M J Leitch, J B McClelland, P L McGaughey (√ Spokesperson), C L Morris, J M Moss, B K Park, J C Peng, W Sondheim, T Thompson
LOUISIANA STATE U – P N Kirk, Y C Wang, Z F Wang
NEW MEXICO STATE U – M Beddo, G Burleson, T H Chang, J Haas, G S Kyle, V Papavassilio, Z M Wang
OAK RIDGE – T Awes, H Kim, F Obenshain, F Plasil, S Saini, P Stankus, G R Young
TEXAS A AND M – C A Gagliardi, E Hawker, R E Tribble
VALPARAISO U, INDIANA – D D Koetke, P Nord, S Stanislaus

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

p nucleon	800 GeV (T_{lab})

Particles studied p

Brief description The experiment is a precision measurement of Drell-Yan yields from hydrogen and deuterium. The ratio of these yields can be used to infer the ratio $\overline{u}(x)/\overline{d}(x)$ in the proton, over the x interval between 0.03 and 0.3 . Measures also the J/ψ, ψ', Υ, Υ', and Υ'' yields from both targets. Uses the Magnetic Dilepton Spectrometer, with 3 dipoles, 3 stations of wire chambers, 1 station with prop-tubes, 4 hodoscope stations, and high rate capability with better than 100 MeV resolution at the J/ψ. Beam produces 10^{12} protons/spill. Targets are LH and LD. Being installed (July 96).

Related experiments FNAL-772, CERN-NA-051

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WWW Home-page http://p2hp2.lanl.gov/e866/e866.html

FNAL-868

(Proposed Sep 1992, Approved Mar 1993, Began data-taking Apr 1995, Completed data-taking Jul 1995)

SEARCH FOR ANTIPROTON DECAY AT THE ANTIPROTON ACCUMULATOR

APEX COLLABORATION
UCLA – C D Buchanan, B Corbin, M A Lindgren, T Muller
FERMILAB – S Geer (√ Spokesperson), J P Marriner, M Martens, R E Ray, Jr , J Streets, W C Wester
MICHIGAN U – H R Gustafson
NEBRASKA U – M J Hu, G R Snow
PENN STATE U – T A Armstrong

Accelerator FNAL-TEV *Detector* Calorimeter

Reactions

$\overline{p} \rightarrow e^-$ X	8.9 GeV/c (P_{lab})

Particles studied $\overline{p}$

Brief description The detector consists of a calorimeter, fiber tracker, pre-radiator, DEDX, and vetos. Uses the Antiproton Accumulator facility. Data analysis in progress (July 96).

Related experiments FNAL-861

E-mail contact sgeer@fnal.gov

WWW Home-page http://fnapx1.fnal.gov/

FNAL-871

(Proposed Oct 1993, Approved Jul 1994, In preparation)

SEARCH FOR *CP* VIOLATION IN THE DECAYS OF $\Xi^-/\overline{\Xi}^+$ AND $\Lambda/\overline{\Lambda}$ HYPERONS

HYPERCP COLLABORATION
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SOUTH ALABAMA U – R K Clark, C M Jenkins
LBL & UC, BERKELEY – W S Choong, R Fuzesy, G Gidal, P Gu, K B Luk (√ Spokesperson), B Turko
FERMILAB – T Carter, M Crisler, C C James, J T Volk
GUANAJUATO U – J Felix-Valdez, G Moreno, M A Sosa Aquino
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LAUSANNE U – N Leros, J-P Perroud
MICHIGAN U – H R Gustafson, M J Longo
VIRGINIA U – K Bodoor, S Conetti, E C Dukes (√ Spokesperson), C Durandet, K S Nelson, D Rajaram, N Saleh, H-G Zhu

Accelerator FNAL-TEV *Detector* Spectrometer, Spectrometer

Reactions

p nucleon $\rightarrow \Xi^-$ X	150 GeV/c
p nucleon $\rightarrow \overline{\Xi}^+$ X	"

Particles studied Ξ^-, $\overline{\Xi}^+$, Ω^-, $\overline{\Omega}^+$

Brief description Unpolarized Ξ^- and $\overline{\Xi}^+$ hyperons are produced by protons and momentum selected by a magnetic

channel. The decay sequences $\Xi^- \rightarrow \Lambda\pi^-$, $\Lambda \rightarrow p\pi^-$, and $\overline{\Xi}^+ \rightarrow \overline{\Lambda}\pi^+$, $\overline{\Lambda} \rightarrow \overline{p}\pi^+$, are detected with a wire chamber spectrometer with high-rate capability. By studying the angular distribution of p ($\overline{p}$) with respect to the helicity axis in the Λ ($\overline{\Lambda}$) rest frame, the decay parameter α (α-bar) can be extracted. The CP symmetry is violated if there is any difference between the products ($\alpha_\Lambda \alpha_\Xi$), and ($\alpha_{\overline{\Lambda}} \alpha_{\overline{\Xi}}$). The apparatus, 60 m long, consists of a hyperon magnet, nine wire chamber stations, a momentum analyzing magnet, two planes of hodoscopes for timing and triggering purposes, and a hadronic calorimeter for triggering. A muon detection system at the rear of the spectrometer allows searches for rare and forbidden hyperon decays. Under construction (July 96).

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WWW Home-page http://beauty1.lbl.gov/e871.html

FNAL-872

(Proposed Jan 1994, Approved Jun 1994, In preparation)

MEASUREMENT OF τ LEPTON PRODUCTION FROM THE PROCESS $\nu_\tau + N \rightarrow \tau + X$

E872 COLLABORATION

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ATHENS U – N Giokaris, G S Tzanakos
UC, DAVIS – V Paolone (√ Spokesperson), P M Yager
KANGWEON NATIONAL U – C H Hahn
CHONNAM NATIONAL U – J-Y Kim
FERMILAB – B R Baller, D Boehnlien, W S Freeman, B G Lundberg (√ Spokesperson), J G Morfin, R A Rameika
GYEONGSANG NATIONAL U – S H Chung, I G Park, J-S Song
KOBE U – S Aoki, T Hara
KON-KUK U – J T Rhee
KOREAN NATIONAL EDUCATION U – S N Kim
MINNESOTA U – P M Border, D P Ciampa, K J Heller, R W Rusack, J Sielaff, J J Trammell, J O Wilcox
NAGOYA U – N Hashizume, K Hoshino, H Iinuma, K Ito, M Kobayashi, M Miyanishi, K Nakajima, M Nakamura, K Niwa, N Nonaka, K Okada, K Saito, K Yamamori
OSAKA PREFECTURE U – H Okabe
PUSAN NATIONAL U – W H Chung
SOUTH CAROLINA U – A Kulik, C Rosenfeld
TOHO U – M Adachi, M Kazuno, Y Kobayashi, E Niu, S Ono, H Shibuya, Y Umezawa
TUFTS U – T Kafka, A Napier, W P Oliver, J Schneps, M Skender
UTSUNOMIYA U – Y Sato, I Tezuka
WONKWANG U – S Y Bahk

Accelerator FNAL-TEV *Detector* Spectrometer

Brief description Measures the production of τ leptons in the charged-current interactions of τ neutrinos. The neutrinos are produced in a beam dump by the 800 GeV proton beam, and interact in an emulsion target. The resulting τ leptons are subsequently detected in a high resolution hybrid emulsion spectrometer, providing a direct confirmation of the existence of the τ neutrino. Under construction (July 96).

Related experiments FNAL-803, CERN-WA-095

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WWW Home-page http://fn872.fnal.gov/

FNAL-875

(Proposed Jan 1995, Approved May 1995, In preparation)

LONG BASELINE NEUTRINO OSCILLATION EXPERIMENT

MINOS COLLABORATION

ARGONNE – I Ambats, D S Ayres (√ Deputy Spokesperson), L J Balka, R E Blair, D A Crane, J W Dawson, T H Fields, M C Goodman, V J Guarino, N F Hill, D J Jankowski, E N May, S Mrenna, L E Price, P Schoessow, R V Seidlein, R Talaga, K M Thompson, J Thron, L R Turner
BOSTON COLL – T E Toohig
CAL TECH – B C Barish, D L Burke, J Hanson, N P Longley, D G Michael, C W Peck
COLUMBIA U – Y Ho, W Lee
FERMILAB – R H Bernstein, V D Bogert, D Coissart, W S Freeman, J Hylen, D E Johnson, G M Koizumi, G Mitselmakher, J G Morfin, F A Nezrick, S C O'Day, R A Rameika, A L Read, W Smart, A Wehman, S Werkema, C P Yun
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DUBNA – S Afanasjev, G D Alexeev, S Borodin, V Brudanin, G Chelkov, Y A Gornushkia, M Ignatankio, N Khovanski, Z V Krumstein, S Olshevski, A B Sadovski, A Sisakian, V Timofeev, L Tkatchev, A I Zinchenko
LIVERMORE – E Ables, R Bionta, R Carney, E P Hartouni, T Ladran, M Libkind, H Olsan, L Ott, E Parker, J Swan, D Wright, C Wuest, T Yokota
LEBEDEV INST – V A Chechin, E P Kuznetesov, V A Tsarev
MINNESOTA U – T Berg, P M Border, T Chase, D P Ciampa, H W J Courant, P Cushman, K J Heller, M L Marshak, D E Maxam, J Meier, B Miller, J K Nelson, E A Peterson, K Ruddick, R W Rusack, M H Schub
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OXFORD U – W W M Allison, C B Brooks, J H Cobb, S Cooper, H Gallagher, A R Holmes, D H Perkins, D A Petyt, P D Shield, J Thomas, R L Wastie, N West
RUTHERFORD – G J Alner, R J Cotton, R Edgecock, G Grayer, P J Litchfield, G F Pearce
STANFORD U – G Irwin, S G Wojcicki (√ Spokesperson)
SUSSEX U – J Byrne, P G Dawber, K Green, P G Harris, D White
TEXAS U – K Lang
TEXAS A AND M – A D David, N Diaczenko, M Drew, H-J Trost, R C Webb
TUFTS U – T Kafka, W A Mann, R H Milburn, A Napier, W P Oliver, J Schneps
WESTERN WASHINGTON U – W L Barrett

Accelerator FNAL *Detector* Calorimeter

Particles studied ν

Brief description The MINOS (Main Injector Neutrino Oscillation Search) collaboration proposes to conduct a search for $\nu_\mu \rightarrow \nu_\tau$ and $\nu_\mu \rightarrow \nu_e$ oscillations using a new wide band (15 GeV) ν_μ beam from the Main Injector with energies well above the τ production threshold. The oscillations will be detected by the comparison of signals in a 'near' detector at Fermilab and a 'far' detector situated 730 km away in the Soudan underground laboratory. A new 10 kton detector will be built at Soudan to allow the study of the oscillation parameters down to $\Delta(m^2) = 0.002$ eV^2 and $\sin^2(2\theta) = 0.01$. The existing, much finer grained but smaller, SOUDAN-2 detector (see the UNDERGROUND-SOUDAN-2 experiment) will provide an independent check of any potential signal with $\sin^2(2\theta) > 1/30$. In preparation (July 96).

Related experiments UNDERGROUND-ICARUS, KEK-362

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WWW Home-page
http://www.hep.anl.gov/NDK/Hypertext/numi.html

FNAL-876

(Proposed Jan 1995, Approved Aug 1995, Began data-taking Dec 1995, Completed data-taking Feb 1996)

CDF HARD DIFFRACTION STUDIES

CDF COLLABORATION

Accelerator FNAL-COLLIDER *Detector* CDF, Other

Reactions

$\overline{p}\,p \rightarrow \overline{p}\,X$ —

Brief description Studies hard and high mass diffraction as a part of the CDF QCD program. The physics goal is a better understanding of the nature of the pomeron's constituents. Detects quasielastically scattered (anti)protons with the precision track detectors (scintillating fiber hodoscopes backed up by a trigger counter), inserted in movable Roman Pots. The track measurement together with the vertex information from the CDF vertex detector can be used to select the high-mass diffractive events. The experiment is carried out in parallel with the other CDF studies, and with the participation of the full CDF Collaboration. Data analysis in progress (July 96). To learn more about the program, please contact the Spokesperson for the Hard Diffraction Group, Dr. Michael Albrow [Fermilab]

Related experiments CERN-UA-008, FNAL-741

E-mail contact albrow@fnal.gov

Other FNAL Experiments

Listed here are some other Fermilab experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. Check also a detailed description of the ongoing projects at the Lab in the annual report 'Fermilab Research Program – Workbook', or visit the Web site http://www.fnal.gov/faw/fermilab_at_work.html

FNAL-683 (Completed data-taking Jan 1992)

PHOTOPRODUCTION OF HIGH $p_\perp$ JETS

Spokesperson: Marjorie D. Corcoran [Rice U.]

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FNAL-706 (Completed data-taking Jan 1992)

A COMPREHENSIVE STUDY OF DIRECT PHOTON PRODUCTION IN HADRON INDUCED COLLISIONS

By E706 Collaboration

Spokesperson: Paul F. Slattery [Rochester U.]

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FNAL-793 (In preparation)

EMULSION EXPOSURE TO 1000 GeV, OR HIGHEST ENERGY PROTONS

Spokesperson: Jere J. Lord [Washington U., Seattle]

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FNAL-802 (Completed data-taking Dec 1991)

DEEP INELASTIC MUON INTERACTIONS WITH NUCLEAR TARGETS USING THE EMULSION TELESCOPE TECHNIQUE

Spokespersons: Lali Chatterjee, Dipak Ghosh [Jadavpur U.]

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FNAL-843 (Completed data-taking Jul 1991)

INTERACTIONS OF 50, 100, AND 490 GeV MUONS WITH EMULSION NUCLEI

Spokesperson: C.O. Kim [Korea U.]

FNAL-853 (Completed data-taking Feb 1996)

TEST OF LOW INTENSITY EXTRACTION FROM THE TEVATRON USING CHANNELING IN A BENT CRYSTAL

Spokespersons: Gerry P. Jackson, C.Thornton Murphy [Fermilab]

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WWW Home-page http://calvin.fnal.gov/~sathyade/cex.html

FNAL-855 (Completed data-taking Dec 1991)

TEST BEAM REQUEST TO DIRECTLY MEASURE dE/dx OF HIGH ENERGY MUONS FROM 150 TO 650 GeV/c IN THE MUON LABORATORY

Spokesperson: George R. Kalbfleisch [Oklahoma U.]

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FNAL-861 (Completed data-taking Oct 1992)

SEARCHING FOR ANTIPROTON DECAY AT THE FERMILAB ANTIPROTON SOURCE

By APEX Collaboration

Spokesperson: Steve Geer [Fermilab]

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WWW Home-page http://fnapx1.fnal.gov/

FNAL-862 (In preparation)

DETECTION OF RELATIVISTIC ANTI-HYDROGEN ATOMS PRODUCED BY PAIR PRODUCTION WITH POSITRON CAPTURE

By ANTIHYDROGEN Collaboration

Spokesperson: David C. Christian [Fermilab]

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WWW Home-page
http://fnphyx-www.fnal.gov/experiments/e862/e862.html

FNAL-864 (Completed data-taking Feb 1996)

MINIMAX: A TEST / EXPERIMENT FOR THE FERMILAB COLLIDER

Spokespersons: Cyrus C. Taylor [Case Western Reserve U.], James D. Bjorken [SLAC]

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WWW Home-page http://fnmine.fnal.gov/

FNAL Future Plans

The 800-GeV fixed target run will continue until early 1998. Typical intensities of 2.5×10^{13} per Tevatron cycle are anticipated, with the experimental program including ϵ'/ϵ, rare kaon decays, charm physics, $\sin^2\theta_W$ from neutrino scattering, and observation of ν_τ. Completion of commissioning of the Main Injector and Recycler is expected by mid 1999, when the upgraded CDF and D0 detectors will start a run. The goal of the run is to deliver at least 2 fb^{-1} to each of the detectors by 2003. The peak luminosity goal is 2×10^{32} cm^{-2}s^{-1}. Construction of the NuMI facilities at Fermilab and Soudan (Minnesota) should begin in 1999, and the two neutrino oscillation experiments will start data taking upon completion. Slow spill 120 GeV protons from the Main Injector will be used for fixed target experiments concurrently with the Tevatron collider program.

Selected DAPHNE Experiments

FRASCATI-DAPHNE-KLOE

(Proposed 1992, Approved Mar 1993, In preparation)

A LARGE GENERAL PURPOSE DETECTOR FOR CP VIOLATION STUDIES IN e^+e^- ANNIHILATIONS AT ϕ

KLOE COLLABORATION
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FRASCATI – A Andryakov, A Antonelli, M Antonelli, D Babusci, R Baldini-Ferroli, S Bellucci, G Bencivenni, S Bertolucci, C Bloise, F Bossi, A Calcaterra, P Campana, G Capon, M Carboni, M Cordelli, R De Sangro, P De Simone, F Donno, G Felici, M L Ferrer, G Finocchiaro, A Gaddi, E Gero, W Grandegger, R Haydar, L Keeble, P Laurelli, A Martini, S Miscetti, S Moccia, F Murtas, G P Murtas, E Pace, V Patera, F Pelucchi, M Piccolo, P Santantonio, M Spinetti, P Valente, X L Wang, S Wolfle, A Zallo
FRASCATI & SUNY, STONY BROOK – J Lee-Franzini
KARLSRUHE U – K Barth, A Denig, M Imhof, C Joram, W Kluge, U von Hagel, S Weseler, R Wieser
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NAPLES U, IFS & INFN, NAPLES – A Aloisio, V Baturin, N Cavallo, F Cevenini, G Chiefari, E Drago, D Fiore, C Gatto, L Merola, M Napolitano, A Smilzo
COLUMBIA U – P M Tuts
PISA U & INFN, PISA – V Bolognesi, F Cervelli, A Ferrari, M Incagli, M M Massai, G Venanzoni
ROME U & INFN, ROME – F Anulli, C Bacci, M Barone, H Beker, C Bini, L Bucci, R Caloi, M Ceru, G De Zorzi, G Di Cosimo, A Di Domenico, P Franzini (√ Spokesperson), P Gauzzi, S Giovanella, F Lacava, G Lanfranchi, A Michetti, A Parri, M Passaseo, E Petrolo, M C Petrucci, L Pontecorvo, E Valente, S Veneziano
ROME U, TORVERGATA – V Bocci, L Cerrito, S D'Angelo, R Messi, L Paoluzi, E Pasqualucci
ROME, ISS – P Branchini, E Graziani, A Passeri, E Spiriti, C Stanescu, L Tortora
SUNY, STONY BROOK – W Kim, M Pollack, R D Schamberger
TRIESTE U, IST FIS & INFN, TRIESTE – G Barbiellini, A Martinis, F Scuri

Accelerator FRASCATI-DAPHNE *Detector* KLOE

Particles studied K_S, K_L

Brief description Studies rare kaon decays, measures $\mathrm{Re}(\epsilon'/\epsilon)$ to the precision of 10^{-4}, analyzes other CP violating parameters in the $K\bar{K}$ system. KLOE consists of a 2-m diameter, 3.5-m long helium-filled central drift chamber, a 4π electromagnetic calorimeter, and a 2.3-m diameter, 4-m long, 0.6 T superconducting coil. The beam pipe is made of 0.5 mm thick beryllium to minimize multiple scattering and energy loss for charged kaons. In preparation. Expected to run in 1997.

Journal papers PL B287 (1992) 259, NP (PROC SUPPL) 37A (1994) 43, NIM A360 (1995) 48, NIM A360 (1995) 201, NIM A367 (1995) 104, NIM A367 (1995) 108, NIM A354 (1995) 352, and NIM A368 (1996) 628.

E-mail contact paolo@lnf.infn.it

WWW Home-page http://www.lnf.infn.it/kloe/kloedef.html

Other DAPHNE Experiments

Listed here is another interesting DAPHNE experiment. Find more details about this projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokesperson.

FRASCATI-DAPHNE-FINUDA (In preparation)

FINUDA: A DETECTOR FOR NUCLEAR PHYSICS AT DAΦNE

By FINUDA Collaboration

Spokesperson: Tullio Bressani [Turin U.]

E-mail contact bressani@to.infn.it

WWW Home-page
http://www.lnf.infn.it/esperimenti/finuda/finuda.html

Selected ITEP Experiments

ITEP-895

(Proposed 1989, Approved 1989, Began data-taking 1991, In progress)

DETAILED STUDY OF SPECTRA OF Λ PARTICLES AND OF THE POLARIZATION IN THE NUCLEAR FRAGMENTATION REGION IN HADRON–NUCLEON INTERACTIONS

LAMBDA-III COLLABORATION

MOSCOW, ITEP – V A Akimov, Y D Bayukov, I M Belyaev, M P Bezuglov, B M Bobchenko, E A Doroshkevich, S V Frolov, Y G Grishuk, Y V Kantserov, M M Katz, S M Kiselev, Y V Korchagin, S V Kuleshov, L N Kuleshova, A I Kurzenkov, A A Lebedev, G A Leksin (√ Spokesperson), N A Pivnyuk, N K Sergeev, V S Serov, S M Shuvalov, A V Smirnitsky (√ Spokesperson), A V Stavinsky, V P Surin, A V Vlasov, K G Voloshin, L S Vorobyev, A V Yumashev, B V Zagreev, V V Zhurkin
KURCHATOV INST, MOSCOW – S L Fokin, M S Ippolitov, A L Lebedev, V I Manko, G M Mgebrishvili, P I Shcherbachev, M A Vasiłyev

Accelerator ITEP *Detector* LAMBDAMETER

Reactions

p Al → Λ X	7.5 GeV/c
p Pb → Λ X	"

Brief description The kinetic energy range of the detector is 10–300 MeV. Taking data.

E-mail contact leksin@vitep2.itep.ru, asmirnitsky@vxitep.itep.ru

ITEP-913

(Proposed 1990, Approved 1990, Began data-taking 1990, Completed data-taking 1993)

STUDY OF THE INTERACTION OF LOW-ENERGY ANTIPROTONS WITH NUCLEI USING THE XENON BUBBLE CHAMBER DIANA

DIANA COLLABORATION

MOSCOW, ITEP – V V Barmin, V G Barylov, G V Davidenko, A G Dolgolenko (√ Spokesperson), V E Lukhmanov, V A Matveev, G S Mirosidi, V A Shebanov, N N Shishov, B S Volkov, N K Zombkovskaya
OSLO U – K M Danielsen, T Jacobsen
FRASCATI & BUCHAREST, IAP – F Nichitiu, C Petrascu
MOSCOW, INR – E S Golubeva, A S Ilyinov, I A Pshenichnov
BERGEN U – K Myklebost, J M Olsen
FRASCATI – C Guaraldo

Accelerator ITEP *Detector* HLBC-DIANA

Reactions

$\bar{p}$ Xe → K_S X	< 1 GeV/c (P_{lab})
$\bar{p}$ Xe → Λ (Σ^0) X	"
$\bar{p}$ Xe → Σ^0 X	"
$\bar{p}$ Xe → K_S K_S X	"
$\bar{p}$ Xe → K_S Λ (Σ^0) X	"
$\bar{p}$ Xe → K^+ Λ (Σ^0) X	"
$\bar{p}$ Xe → K^+ Σ^+ X	"
$\bar{p}$ Xe → K^+ Σ^- X	"
$\bar{p}$ Xe → K^+ K^+ X	"
$\bar{p}$ Xe → K_S K^- X	"
$\bar{p}$ Xe → K^+ K^- X	"
$\bar{p}$ Xe → K_S Σ^+	"
$\bar{p}$ Xe → K_S Σ^-	"
$\bar{p}$ Xe → ω X	"
$\bar{p}$ Xe → η X	"

Brief description Uses the 700-liter Xenon bubble chamber DIANA. Studies the production of strange particles and η, ω mesons in low-energy $\bar{p}$ Xe annihilations.

Journal papers YF 55 (1992) 1253 = SJNP 55 (1992) 698, YF 55 (1992) 1268 = SJNP 55 (1992) 705, NP A556 (1993) 409, NP A558 (1993) 361c, YF 57 (1994) 1724 = PAN 57 (1994) 1656, YF 57 (1994) 1905 = PAN 57 (1994) 1835, and PL B370 (1996) 233.

E-mail contact dolgolenko@vxitep.itep.ru

ITEP-922

(Proposed 1992, Approved 1992, Began data-taking 1996, In progress)

SEARCH FOR *H*-PARTICLE AND RESONANT STATES IN ΛΛ SYSTEM

MOSCOW, ITEP – E G Bogdanov, V S Demidov (√ Spokesperson), N D Galanina, K E Gusev, N A Khaldeeva, V N Markisov, A A Nedosekin, V A Sadykov, M E Vishnevsky, M O Vlasova

Accelerator ITEP *Detector* Spectrometer

Reactions

n nucleus → Λ Λ X	4–9 GeV/c (P_{lab})
n nucleus → dibaryon($S = -2$) X	"

Brief description Search for the H-dibaryon through the $\pi^- p\Lambda$ decay channel. Taking data (July 96).

E-mail contact demidov@vxitep.itep.ru

Other ITEP Experiments

Listed here are some other ITEP experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons.

ITEP-832 (Taking data)

A TRACKING EXPERIMENT FOR STUDY OF DOUBLE BETA DECAY IN ^{136}Xe and ^{150}Nd

Spokespersons: V.A. Lyubimov, O.Ya. Zeldovich [Moscow, ITEP]

E-mail contact lubimov@vxitep.itep.ru, zeldovich@vxitep.itep.ru

ITEP-853 (Completed data-taking 1991)

STUDY OF PIONIC NUCLEAR DEGREES OF FREEDOM IN $(\pi, \pi\pi)$ REACTIONS

Spokespersons: M.V. Kossov, G.A. Leksin [Moscow, ITEP]

E-mail contact kossov@cebaf.gov, leksin@vitep2.itep.ru

ITEP-861 (Completed data-taking 1991)

SEARCH FOR ^{76}Ge DOUBLE BETA DECAY

Spokesperson: I.V. Kirpichnikov [Moscow, ITEP]

E-mail contact kirpichnikov@vxitep.itep.ru

ITEP-865 (Completed data-taking 1992)

ANTIPROTON–NUCLEI ANNIHILATION CROSS-SECTIONS WITH Be, C, Al, Fe, Cd, Cu, AND Pb TARGETS AT 0.70, 0.95, 1.26, 1.53, 1.76 AND 2.50 GeV/c

Spokesperson: Yu.B. Lepikhin [Moscow, ITEP]

E-mail contact smirnitsky@vxitep.itep.ru

SUMMARIES OF ITEP (MOSCOW) EXPERIMENTS

ITEP-873 (Completed data-taking 1991)

HIGH-ENERGY CUMULATIVE PARTICLE PRODUCTION AT 10 GeV

Spokespersons: Yu.T. Kiselev, Yu.V. Terekhov [Moscow, ITEP]

E-mail contact yurikis@vxitep.itep.ru, yurikis@vxcern.cern.ch

ITEP-876 (Completed data-taking 1992)

SEARCH FOR ^{94}Zr AND ^{96}Zr DOUBLE BETA DECAYS IN PHOTOGRAPHIC EMULSION

Spokesperson: A.S. Barabash [Moscow, ITEP]

E-mail contact barabash@vxitep.itep.ru

ITEP-892 (Completed data-taking 1994)

STUDY OF ^{4}He p INTERACTIONS

Spokesperson: V.E. Grechko [Moscow, ITEP]

E-mail contact grechko@vitep1.itep.ru

ITEP-894 (Completed data-taking 1991)

QUASIPARTICLE VELOCITY MEASUREMENTS

Spokespersons: G.A. Leksin, A.V. Vlassov [Moscow, ITEP]

E-mail contact leksin@vitep2.itep.ru, vlassov@vxitep.itep.ru

ITEP-896 (Taking data)

TWO-NEUTRINO DOUBLE BETA DECAY OF ^{100}Mo TO THE FIRST EXCITED 0^+ STATE IN ^{100}Ru

Spokespersons: A.S. Barabash [Moscow, ITEP], F.T. Avignone [South Carolina U.]

E-mail contact barabash@vxitep.itep.ru

ITEP-897 (Completed data-taking 1991)

STUDY OF ^{4}He π^- INTERACTIONS

Spokesperson: V.E. Grechko [Moscow, ITEP]

E-mail contact grechko@vitep5.itep.ru

ITEP-901 (Taking data)

QUASIELASTIC (π^-, d) BACKWARD SCATTERING ON NUCLEI AT 0.7–1.3 GeV

Spokesperson: A.P. Krutenkova [Moscow, ITEP]

E-mail contact krutenkova@vxitep.itep.ru

ITEP-911 (Completed data-taking 1994)

FORWARD DIRECTION CUMULATIVE PARTICLE PRODUCTION AT 10 GeV

Spokespersons: Yu.T. Kiselev, V.A. Sheinkman [Moscow, ITEP]

E-mail contact yurikis@vxitep.itep.ru, yurikis@vxcern.cern.ch

ITEP-912 (Taking data)

SEARCH FOR NEUTRINOLESS DOUBLE BETA DECAY OF ^{76}Ge

Spokespersons: I.V. Kirpichnikov [Moscow, ITEP], R.L. Brodzinski [Battelle Memorial Inst., Northwest], F.T. Avignone [South Carolina U.], A. Morales [Zaragoza U.]

E-mail contact kirpichnikov@vxitep.itep.ru, amorales@gae.unizar.es

ITEP-914 (Taking data)

MEASUREMENT OF SPIN ROTATION PARAMETERS R AND A IN ELASTIC π p SCATTERING

By ITEP-PNPI Collaboration

Spokespersons: V.P. Kanavets [Moscow, ITEP], S.P. Kruglov [St. Petersburg, INP]

E-mail contact alekseev@vitep3.itep.ru, kruglov@lnpi.spb.su

ITEP-921 (Taking data)

INVESTIGATION OF QUASICOHERENT AND DEEP INELASTIC INTERACTIONS OF PIONS AND PROTONS WITH NUCLEI

Spokespersons: V.S. Demidov, I.V. Kirpichnikov [Moscow, ITEP]

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ITEP-923 (Completed data-taking 1994)

INCLUSIVE PION DOUBLE CHARGE EXCHANGE ON LIGHT NUCLEI AT 0.7–1.3 GeV/c

Spokesperson: A.P. Krutenkova [Moscow, ITEP]

E-mail contact krutenkova@vxitep.itep.ru, kulikov@vxitep.itep.ru

ITEP-941 (Taking data)

SUBTHRESHOLD K^+ PRODUCTION IN PROTON–NUCLEUS COLLISIONS

Spokespersons: Yu.T. Kiselev, V.A. Sheinkman [Moscow, ITEP]

E-mail contact yurikis@vxitep.itep.ru, yurikis@vxcern.cern.ch

ITEP-942 (Taking data)

SEARCH FOR D' DIBARYON IN pp INTERACTIONS

Spokesperson: A.I. Sutormin [Moscow, ITEP]

E-mail contact khanov@vitep5.itep.ru, kulikov@vxitep.itep.ru

ITEP-951 (Taking data)

SUBTHRESHOLD K^- PRODUCTION IN PROTON–NUCLEUS COLLISIONS

Spokespersons: Yu.T. Kiselev, V.A. Sheinkman [Moscow, ITEP]

E-mail contact yurikis@vxitep.itep.ru, yurikis@vxcern.cern.ch

NEMO-2 (Taking data)

DOUBLE BETA DECAY EXPERIMENTS WITH THE TRACKING DETECTOR NEMO-2

By NEMO Collaboration

Spokesperson: S. Jullian [Orsay, LAL]

E-mail contact jullian@lalcls.in2p3.fr, barabash@vxitep.itep.ru

ITEP Future Plans

The ITEP's U-10 proton synchrotron will continue investigations of particle interactions with nuclei. The program includes experiments on the subthreshold production of particles, studies of cumulative effects, and a search for multi-quark states in nuclei. The synchrotron will also be used to continue polarization experiments in the resonance region, and in a search for exotic resonances. Test beams will be utilized in a development and testing of equipment for experiments at CERN, DESY, FNAL and other facilities. A special proton beam will be devoted to the medical treatment of cancer patients. The study of double beta decays and other rare processes remains another important topic in the ITEP's experimental program.

Selected JINR Experiments

JINR-LHE-0941-1B

(Proposed Sep 1992, Approved Nov 1992, Began data-taking Sep 1993, In progress)

STUDIES OF POLARIZATION CHARACTERISTICS OF INELASTIC SCATTERING AND BREAKUP OF RELATIVISTIC POLARIZED DEUTERONS ON PROTONS AND COMPARISON WITH DATA OBTAINED WITH NUCLEAR TARGETS

DUBNA – L S Azhgirey, Y T Borzunov, E V Chernykh, L B Golovanov, A D Kirillov, V P Ladygin, L V Malinina, P K Manyakov, N M Piskunov (√ Spokesperson), P A Rukoyatkin, I M Sitnik, G D Stoletov, E A Strokovsky (√ Spokesperson), A L Svetov, A P Tsvinev, S A Zaporozhets
SAMARA AIRSPACE U – P P Korovin
WILLIAM AND MARY COLL – C F Perdrisat
SOFIYA, INST CHEM TECH – S Nedev
KIEV, ITF – A P Kobushkin, A I Syamtomov
NORFOLK STATE U – V Punjabi

Accelerator JINR *Detector* ALPHA

Reactions

deut $p \rightarrow$ deut X	4.5 – 9 GeV/c
deut $p \rightarrow p$ X	"
deut nucleus $\rightarrow$ deut X	"

Particles studied $N(1440\,P_{11})$

Brief description One of the goals of the experiment is to study the mechanism of the reaction $p(N, N')X$ with excitation of Δ and $N^*(1440)$ resonances. The $p(d, d')X$ reaction is chosen because the excitation of the Roper resonance is enhanced due to the isospin selection rules. A study of the expected interference effects between Δ and $N^*(1440)$ resonances in polarization observables of this reaction is planned. The data will provide valuable information about properties of the Roper resonance and also help resolve the existing theoretical uncertainties. It also measures the tensor analyzing power T_{20} in inclusive deuteron breakup at 9 GeV/c and 0° on hydrogen and carbon targets.

Journal papers NIM A357 (1995) 386, and PL B361 (1995) 21.

Related experiments JINR-LHE-0941-1C, SATURNE-250, SATURNE-278

E-mail contact piskunov@sunhe.jinr.dubna.su, strok@sunhe.jinr.dubna.su

Other JINR Experiments

Listed here are some other Dubna experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. For a complete description of the current Lab's experimental research program, visit the JINR experiments' Web page at: http://sunhe.jinr.dubna.su/~strok/explist.html

JINR-LHE-0936-3 (Taking data)

SEARCH FOR NARROW HADRONIC RESONANCES PRODUCED IN NEUTRON–PROTON INTERACTIONS

Spokesperson: Yu.A. Troyan [Dubna, JINR]

E-mail contact troyan@lhe09.jinr.dubna.su, troyan@sunhe.jinr.dubna.su

JINR-LHE-0941-1A (Completed data-taking 1994)

MEASUREMENTS OF TENSOR ANALYSING POWER IN BACKWARD ELASTIC dp SCATTERING AND BREAKUP AT 180° (CM) BETWEEN 3.5 - 6.5 GeV/c

Spokespersons: N.M. Piskunov, I.M. Sitnik, E.A. Strokovsky [Dubna, JINR]

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JINR-LHE-0941-1C (Taking data)

SEARCH FOR $\Delta\Delta$ DIBARYON PRODUCTION USING SPIN DEPENDENT INELASTIC DEUTERON–DEUTERON SCATTERING

Spokespersons: N.M. Piskunov [Dubna, JINR], F.W. Hersman [New Hampshire U.]

E-mail contact piskunov@sunhe.jinr.dubna.su, hersman@unh.edu

JINR-LHE-0941-1D (Completed data-taking Oct 1993)

MEASUREMENTS OF THE POLARIZATION TRANSFER COEFFICIENT IN BREAKUP OF RELATIVISTIC POLARIZED DEUTERONS INTO PROTONS EMITTED AT 0°

Spokespersons: N.M. Piskunov, I.M. Sitnik [Dubna, JINR]

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JINR-LHE-0941-1E (Completed data-taking Nov 1994)

MEASUREMENTS OF THE POLARIZATION TRANSFER COEFFICIENT AND TENSOR ANALYSING POWER IN BREAKUP OF RELATIVISTIC POLARIZED DEUTERONS INTO PROTONS EMITTED AT 0°

Spokespersons: L.N. Strunov, A.V. Zarubin [Dubna, JINR]

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JINR-LHE-0941-3 (In preparation)

STUDIES OF SPIN-SPIN CORRELATIONS IN BACKWARD ELASTIC DEUTERON-PROTON SCATTERING

Spokespersons: L.S. Azhgirey, I.M. Sitnik [Dubna, JINR], M.P. Rekalo [Kharkov, FTI]

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JINR-LHE-0941-4 (Taking data)

SPIN DEPENDENT TOTAL CROSS-SECTION DIFFERENCES IN np SCATTERING

Spokespersons: B.A. Khachaturov, N.M. Piskunov, V.I. Sharov, L.N. Strunov [Dubna, JINR], H.M. Spinka [Argonne], F. Lehar [Saclay]

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JINR-LHE-0941-5 (Completed data-taking 1992)

INVESTIGATION OF FSI AND INTERMEDIATE ISOBAR EFFECTS IN 4π GEOMETRY dp INTERACTIONS

Spokespersons: V.V. Glagolev [Dubna, JINR], G. Martinska [Kosice U.], M.S. Nioradze [Tbilisi State U.], T. Siemiarczuk [Warsaw, INR]

E-mail contact glagolev@sunhe.jinr.dubna.su, martinov@kosice.upjs.sk

JINR-LHE-0969 (Taking data)

INVESTIGATION OF PION–NUCLEON AND NUCLEON–NUCLEON INTERACTIONS

Spokesperson: A.B. Kurepin [Moscow, INR]

E-mail contact kurepin@al20.inr.troitsk.ru

JINR-LHE-0971-1 (Taking data)

MEASUREMENTS OF INCLUSIVE, QUASIELASTIC AND INELASTIC ANALYZING POWERS IN PROTON–CARBON SCATTERING

Spokespersons: L.I. Sarycheva [Moscow State U.], A.I. Malakhov [Dubna, JINR]

E-mail contact lis@alex.npi.msu.su, malakhov@lhe32.jinr.dubna.su

JINR-LHE-0971-2 (In preparation)

MEASUREMENTS OF THE A DEPENDENCE OF THE LEADING PARTICLES YIELD FROM NUCLEI

Spokespersons: L.I. Sarycheva [Moscow State U.], A.I. Malakhov [Dubna, JINR]

E-mail contact lis@alex.npi.msu.su, malakhov@lhe32.jinr.dubna.su

JINR-LHE-0983-4 (Taking data)

THE STUDY OF THE TENSOR ANALYZING POWER IN CUMULATIVE PARTICLES PRODUCTION ON A POLARIZED DEUTERON BEAM AT THE DUBNA SYNCHROPHASOTRON

Spokespersons: A. Litvinenko, L. Zolin [Dubna, JINR]

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JINR-LHE-1010 (In preparation)

INVESTIGATION OF SPIN PHENOMENA IN THE ENERGY RANGE CORRESPONDING TO TRANSITION FROM NUCLEON TO QUARK-GLUON DEGREES OF FREEDOM IN NUCLEI

Spokespersons: A.A. Baldin, A.S. Vodopianov [Dubna, JINR]

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JINR-LHE-1011-1 (Taking data)

MEASUREMENTS OF INCLUSIVE AND CORRELATION CHARACTERISTICS IN CUMULATIVE KINEMATICAL REGION IN dp AND dd INTERACTION WITH POLARIZED DEUTERON BEAM

Spokespersons: Yu.A. Panebratsev, S.S. Shimanskiy [Dubna, JINR]

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JINR-LNP-09 (Taking data)

SEARCH FOR NARROW DIBARYON RESONANCES IN THE DOUBLE PROTON-PROTON BREMSSTRAHLUNG REACTION AT THE ENERGY BELOW THE PION THRESHOLD

Spokesperson: A.S. Khrykin [Dubna, JINR]

E-mail contact khrykin@nusun.jinr.dubna.su

JINR-LNP-23 (Taking data)

THE EXPERIMENTAL STUDY OF np ELASTIC SCATTERING AMPLITUDES AT 16 MeV

Spokespersons: Yu.A. Usov [Dubna, JINR], I. Wilhelm [Charles U.]

E-mail contact usov@main1.jinr.dubna.su, ivan.wilhelm@ruk.cuni.cz

JINR Future Plans

The 1996–98 JINR Scientific Program shows a clear commitment to continuation of both the theoretical (particularly related to phenomenology), and the experimental research. The experimental groups will be working at Dubna and at other institutions (IHEP, CERN, DESY, BNL, ...). The at-home experiments include (i) the studies of polarization phenomena using beams of polarized deuterons and nucleons from the LHE acceleration complex, and (ii) investigations of the color degrees of freedom in the nuclear matter with the Nuclotron relativistic nuclei beams, at the transition energies region where the non-perturbative QCD effects are considered significant. The priorities in the machine physics are the completion of the slow extraction system for the Nuclotron, and further development of the extracted beam infrastructure at the LHE complex. [Nuclotron is a new superconductive synchrotron, built for acceleration of protons up to the kinetic energy of 12.8 GeV, and deuterons and other nuclei, including uranium, up to 6 GeV/A (for Z/A = 1/2)].

Selected KEK Experiments

KEK-TE-001

(Approved Mar 1983, Began data-taking Nov 1986, Completed data-taking May 1995)

TRISTAN e^+e^- EXPERIMENTS BY THE VENUS COLLABORATION

VENUS COLLABORATION

TOKYO METROPOLITAN U – M Chiba, T Hirose, N Hosoda, T Oyama, F Yabuki
TOHOKU U – K Abe, J MacNaughton
KEK – K Amako, Y Arai, M Fukawa, Y Fukushima, F Hinode, N Ishihara, N Kanematsu, J Kanzaki, T Kondo, T Matsui (Spokesperson), S Odaka, K Ogawa, T Ohama, M Sakuda, N Sato, J Shirai, T Sumiyoshi, F Takasaki, T Tsuboyama, S Uehara, Y Unno, M Utsumi, Y Watase, Y Yamada
TSUKUBA U, INST APPL PHYS – T Arima, Y Asano (Spokesperson), H Hamasaki, M Miura, S Mori, M Shirakata, Y Takada, K Yusa
YASUDA WOMENS JR COLL – Y Chiba
WAKAYAMA MEDICAL COLL – M Daigo
OSAKA U – J Haba, H Hanai, N Kanda, A Kruger, Y Nagashima, A Suzuki, H Takaki, M Takita, D Tatsumi, Y Yamamoto
KYOTO U – Y Hemmi, R Kikuchi, H Kurashige, K Miyake, A Okamoto, H Sakamoto
TOHOKU GAKUIN U – M Higuchi, Y Hoshi, M Sato
KOBE U – Y Homma, A Ono
HIROSHIMA U – Y Iwata, T Ohsugi, H Ohyama
KEK & HELSINKI U – T T Korhonen
OKAYAMA U – E K Matsuda, K Okabe, N Tamura
TOKYO, INTERNATIONAL CHRISTIAN U – Y Nakagawa, T Yamagata
MIYAZAKI U – T Nakamura
TSUKUBA U – I Nakano
IBARAKI COLL TECH – M Shioden
KOGAKUIN U – K Tobimatsu, T Watanabe
TSUKUBA COLL TECH – Y Yonezawa
NARUTO U OF EDUCATION – H Yoshida

Accelerator KEK-TRISTAN *Detector* VENUS

Reactions

$e^+ e^-$	< 70 GeV (E_{cm})

Brief description Physics topics include a reevaluation of the electroweak processes with higher precision and studies of QCD through quark-pair production in photon–photon collisions. The integrated luminosity for the experiment reached 400 inverse picobarns. Data analysis in progress (June 96).

Journal papers NIM 217 (1983) 181, JJAP 23 (1984) 897, NIM A228 (1985) 309, NIM A238 (1985) 328, NIM A243 (1986) 58, NIM A253 (1986) 27, IEEE TNS 33 (1986) 73, JJAP 25 (1986) 1049, NIM A254 (1987) 35, NIM A254 (1987) 317, NIM A259 (1987) 430, NIM A259 (1987) 438, JJAP 26 (1987) 982, JPSJ 56 (1987) 3763, JPSJ 56 (1987) 3767, PL B198 (1987) 570, PRL 59 (1987) 2915, NIM A265 (1988) 457, NIM A269 (1988) 171, NIM A269 (1988) 522, NIM A270 (1988) 319, NIM A271 (1988) 432, NIM A272 (1988) 687, IEEE TNS 35 (1988) 300, PL B207 (1988) 355, PL B213 (1988) 400, PRL 61 (1988) 915, NIM A274 (1989) 183, NIM A281 (1989) 462, IEEE TNS 36 (1989) 665, *IEEE TNS 36 (1989) 670, JJAP 28 (1989) 1981, JPSJ 58 (1989)* 3037, PL B232 (1989) 425, PL B232 (1989) 431, PRL 63 (1989) 1776, ZPHY C45 (1989) 175, PR D39 (1989) 3524, PL B234 (1990) 202, PL B234 (1990) 382, PL B240 (1990) 232, PL B246 (1990) 297, ZPHY C48 (1990) 13, NIM A301 (1991) 497, NIM A303 (1991) 346, NIM A305 (1991) 71, PL B264 (1991) 212, PL B266 (1991) 188, PL B267 (1991) 309, PRL 66 (1991) 280, NIM A311 (1992) 57, NIM A322 (1992) 211, NIM A323 (1992) 471, PL B278 (1992) 393, PL B278 (1992) 499, NIM A330 (1993) 64, PL B302 (1993) 119, PL B313 (1993) 245, PL B313 (1993) 288, PRL 71 (1993) 38, NIM A340 (1994) 501, PL B331 (1994) 211, PRL 72 (1994) 3313, ZPHY C63 (1994) 213, JPSJ 64 (1995) 435, and ZPHY C69 (1996) 597.

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KEK-TE-002

(Approved Mar 1983, Began data-taking Nov 1986, Completed data-taking May 1995)

STUDY OF e^+e^- ANNIHILATION PHENOMENA BY A DETECTOR WITH PARTICLE IDENTIFICATION

TOPAZ COLLABORATION

NARA WOMENS U – K Adachi, S Awa, N Fujiwara, H Hayashii, H Ikeda, M Iwasaki, Y Kayahara, K Miyabayashi, K Muramatsu, T Nagira, M Nakajima, H Nishioka, N Nishiwaki, S Noguchi, M Ohkura, E Sakai, M Takemoto, N Toomi, A Yamaguchi, Y Yoake
TOKYO U OF AGRIC TECH – K Emi, N Fujio, K Harigae, H Hirano, S Hori, K Iwashiro, H Mamada, O Nitoh, S Onodera, T Shinohara, K Takahashi, O Tsumura, J Yoshizawa
NAGOYA U – K Abe, T Abe, M Aoki, R Kajikawa (Spokesperson), K Kurata, H Masuda, K Matsushita, K Nakabayashi, N Ohishi, T Ohshima, N Sasayama, K Shimozawa, A Sugiyama, S Suzuki, H Takamure, F Teramae, M Tomoto, T Toyama
KEK – I Adachi, R Belušević, H B Dijkstra, M Doser, R Enomoto, H Fujii, K Fujii, J Fujimoto, N Iida, H Ikeda, R Itoh, H Iwasaki, S Iwata, S Kawabata (Spokesperson), H Kichimi, M Kobayashi, S Kuroda, T Matsuda, A Miyamoto, K Nakamura, Y Ohnishi, H Ozaki, T Sato, R Sugahara, T Suwada, T Tauchi, T Tsukamoto, S Uno, O Yamakawa, A Yamamoto, M Yamauchi, Y Yoshimura, M Yoshioka
TOKYO U – H Aihara, T Kamae, T Kishida, N Kusuki, F Sai, A Shirahashi, S Yamamoto, S Yamashita
OSAKA CITY U – K Fujita, S Higashi, Y Inoue, Y Kato, A Maruyama, M Nakamura, E Nakano, M Nakayama, T Okusawa, T Sato, A Shimonaka, T Takahashi, T Tanaka, Y Teramoto
PURDUE U – B Howell, D Koltick, I Levine, E Shibata
TOKYO INST TECH – M Aoki, K Kaneyuki, S Minami, N Nakagawa, A Ochi, Y Ohshima, N Sugiyama, T Tachibana, T Tanimori, K Watanabe, Y Watanabe
TOKYO U, INS – A Imanishi, T Ishii, S Kato, K Maruyama, T Morimoto, H Okuno
KOBE U – T Fujii, K Fujiwara, K Nagai
TEZUKAYAMA U – F Ochiai

Accelerator KEK-TRISTAN *Detector* TOPAZ

Reactions

$e^+ e^-$	< 70 GeV (E_{cm})

Brief description Searches for new particles such as heavy quarks, heavy leptons, and various supersymmetric particles, and studies in detail electroweak as well as QCD phenomena. The detector has large solid angle coverage with very good particle identification and 3-dimensional tracking capabilities. The total integrated luminosity for the experiment is about 330 inverse picobarns. Data analysis in progress (June 96).

Journal papers NIM A225 (1984) 23, NIM A236 (1985) 55, NIM A252 (1986) 423, NIM A256 (1987) 449, NIM A269 (1988) 507, NIM A269 (1988) 513, NIM A270 (1988) 11, NIM A271 (1988) 404, PL B200 (1988) 391, PL B208 (1988) 319, PRL 60 (1988) 97, PR D37 (1988) 1339, PL B218 (1989) 105, PL B227 (1989) 495, PL B228 (1989) 553, PL B229 (1989) 427, NIM A297 (1990) 148, PL B234 (1990) 185, PL B234 (1990) 197, PL B234 (1990) 525, PL B240 (1990) 513, PL B244 (1990) 352, PL B249 (1990) 336, NIM A300 (1991) 575, PL B255 (1991) 613, PL B268 (1991) 457, NIM A312 (1992) 440, NIM A316 (1992) 202, PL B278 (1992) 506, PL B279 (1992) 422, PL B284 (1992) 144, PL B291 (1992) 206, NIM A334 (1993) 367, PL B304 (1993) 373, PL B313 (1993) 475, PL B314 (1993) 149, PL B314 (1993) 471, PL B328 (1994) 535, PL B332 (1994) 477, PL B340 (1994) 135, PL B341 (1994) 99, PL B341 (1994) 238, PR D50 (1994) 1879, PL B345 (1995) 335, PL B347 (1995) 171, PL B347 (1995) 179, PL B361 (1995) 199, and PL B368 (1996) 299.

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KEK-TE-003

(Proposed 1983, Approved Nov 1983, Began data-taking Nov 1986, Completed data-taking Jun 1994)

AMY — A HIGH RESOLUTION LEPTON DETECTOR FOR TRISTAN

AMY COLLABORATION
ROCHESTER U – A Bodek, B J Kim, T Kumita, Y K Li, C Velissaris
SOUTH CAROLINA U – C Rosenfeld, S Wilson
KOREA U – J S Kang, D Y Kim
LOUISIANA STATE U – P Kirk
BEIJING, IHEP – M H Ye, Z P Zheng
VIRGINIA TECH – A Abashian, K Gotow, D Haim, M E Mattson, L Piilonen
UC, DAVIS – R E Breedon, W Ko, R L Lander, J Rowe, J R Smith, D Stuart
HAWAII U – S Kanda, S L Olsen (Spokesperson), K Ueno
KEK – K Abe (Spokesperson), Y Fujii, Y Kurihara, F Liu, A Maki, T Nozaki, T Omori, H Sagawa, Y Sakai, T Sasaki, Y Sugimoto, Y Takaiwa, S Terada
GYEONGSANG NATIONAL U – S K Choi
KONAN U – F Kajino
MINNESOTA U – T Thomas
NIIGATA U – T Aso, K Miyano, H Miyata, N Takashimizu
NIHON DENTAL COLL – Y Yamashita
RUTGERS U – F Sannes, S Schnetzer, R Stone, J Vinson
SAGA U, JAPAN – S Behari, S Kobayashi, A Murakami, K S Saroj
SEOUL NATIONAL U – S K Kim, M H Lee, S S Myung
KYUNGPOOK NATIONAL U – D Son
CHUO U, TOKYO – S Matsumoto
SAITAMA U – T Ishizuka

Accelerator KEK-TRISTAN *Detector* AMY

Reactions
$e^+ e^-$ < 70 GeV (Ecm)

Brief description Data analysis in progress (June 96).

Journal papers IEEE TNS 23 (1987) 520, NIM A260 (1987) 361, NIM A265 (1988) 141, PRL 60 (1988) 93, PRL 60 (1988) 2359, PRL 61 (1988) 911, NIM A274 (1989) 95, NIM A283 (1989) 665, PL B218 (1989) 112, PL B218 (1989) 499, PL B223 (1989) 476, PL B228 (1989) 548, PRL 62 (1989) 1713, PRL 63 (1989) 1342, PRL 63 (1989) 1772, PRL 63 (1989) 1910, PRL 63 (1989) 2341, PL B234 (1990) 534, PL B240 (1990) 243, PL B244 (1990) 573, PL B252 (1990) 491, PRL 64 (1990) 984, PR D41 (1990) 2675, PR D42 (1990) 737, PR D42 (1990) 949, PR D42 (1990) 1339, IJMP A6 (1991) 2583, NIM A307 (1991) 52, NIM A317 (1992) 75, NIM A323 (1992) 601, PL B277 (1992) 215, PL B303 (1993) 385, PL B313 (1993) 469, PL B325 (1994) 248, and PL B346 (1995) 208.

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WWW Home-page http://amywww.kek.jp/

KEK-162

(Proposed 1987, Approved Oct 1987, Began data-taking 1996, In progress)

MEASUREMENT OF THE *CP*-VIOLATING DIRECT AMPLITUDE IN $K_L^0 \to \pi^0 e^+ e^-$ DECAY

KYOTO U – H Kurashige, T T Nakamura, T Nomura, H Sakamoto, N Sasao (Spokesperson), M Suehiro
KEK – Y Fukushima, M Noumachi, O Sasaki, T Taniguchi

Accelerator KEK-PS *Detector* TOKIWA

Reactions
$K_L \to \pi^0 e^+ e^-$ —

Particles studied K_L

Brief description The apparatus consists of large drift chambers, a UV-sensitive Čerenkov counter for detection of electrons, and an electromagnetic CsI calorimeter with a good energy resolution. The drift chambers use argon and CF_4 gas. Sensitive to branching ratios smaller than 10^{-10}. Taking data (July 96).

Journal papers NIM A270 (1988) 106, NIM A283 (1989) 709, and NIM A317 (1992) 213.

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KEK-231

(Proposed 1990, Approved Jul 1990, Began data-taking 1994, Completed data-taking 1994)

STUDY OF VIOLATION OF TIME REVERSAL INVARIANCE IN NEUTRON REACTIONS

KEK – T Adachi, S Ishimoto, Y Masuda (Spokesperson), Y Mori, K Morimoto, H M Shimizu
KYOTO U – M Iinuma, A Masaike, Y Matsuda
TOKYO INST TECH – K Asahi, M Harada, H Sato
TOHOKU U – K Sakai, S Tanaka, A Yamaguchi

Accelerator KEK-PS *Detector* Counter

Reactions Polarized beam and target
$n\ ^{139}\mathrm{La} \to n\ \mathrm{X}$ —
$n\ ^{81}\mathrm{Br} \to n\ \mathrm{X}$ —

Journal papers NIM A264 (1987) 169, NP A504 (1989) 269, and HFI 74 (1992) 149.

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KEK-246

(Approved Jul 1991, In progress)

SEARCH FOR *T*-VIOLATING MUON POLARIZATION IN $K^+ \to \pi^0 \mu^+ \nu$ DECAY USING STOPPED KAONS

E246 COLLABORATION
KEK – J Imazato (Spokesperson), Y Kuno, H M Shimizu, K H Tanaka
TOKYO U, INS – M Aoki, Y Fujita, H Outa, S Sugimoto, T Yamazaki
TOKYO U – R S Hayano, T Ishikawa, H Tamura
MOSCOW, INR – D V Dementyev, M Grigorev, A P Ivashkin, M M Khabibullin, Y G Kudenko, V M Lobashev, O V Mineev, V Popov
TSUKUBA U – I Arai, Y Igarashi, T Ikeda, M Ise, K Shibata
TSUKUBA U, INST APPL PHYS – M Abe, Y Asano
IBARAKI U, HITACHI – T Yokoi
TOKYO INST TECH – S Shimizu
SASKATCHEWAN U – T Baker, C Rangacharyulu, Y M B Shin
YONSEI U – E J Kim, J M Lee, Y H Shin
KYUNGSUNG U – Y M Park
BRITISH COLUMBIA U – P Gumplinger, M Hasinoff, E Saettler
TRIUMF – J Doornbos, R Henderson, J A Macdonald, N Stevenson
MONTREAL U – P Depommier
VIRGINIA TECH – M Blecher
KANAGAWA U – A Kaga

Accelerator KEK-PS *Detector* Spectrometer

Reactions
$K^+ \to \pi^0\ \mu^+\ \nu$ 0 GeV/c (P_{lab})

Particles studied K^+

Brief description Uses the Superconducting Toroidal Spectrometer. Approved for 450 shifts. Taking data (July 96).

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KEK-304

(Approved 1995, Began data-taking 1996, In progress)

STUDY OF $K^+ \to \pi^0 e^+ \nu$

Accelerator KEK-PS *Detector* ?

Particles studied K^+

Brief description A collaboration of KEK, Tokyo Inst. Tech., and Tokyo U. Taking data (July 96). For further information, please contact the Spokesperson, Dr. Takayoshi Ohshima [KEK].

E-mail contact ohshima@kekvax.kek.jp

KEK-362

(Approved 1995, In preparation)

A LONG BASELINE NEUTRINO OSCILLATION EXPERIMENT USING KEK-PS AND SUPER-KAMIOKANDE

Accelerator KEK-PS *Detector* ?

Particles studied ν

Brief description An international collaboration of scientists from Japan and USA. In preparation (July 96). For further information, please contact the Spokesperson, Dr. Koichiro Nishikawa [KEK].

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WWW Home-page http://pnahp.kek.jp/

KEK-BF-BELLE

(Proposed 1994, Approved Mar 1994, In preparation)

A STUDY OF CP VIOLATION IN B MESON DECAYS

BELLE COLLABORATION

Accelerator KEK-B-FACTORY *Detector* BELLE

Brief description KEK B-factory is expected to be capable of producing more than ten million B meson pairs each year. When the facility becomes operational, the proposed experiment will study various aspects of B meson physics, including the long-standing puzzle of the violation of CP symmetry. The collaboration consists of physicists from six countries and more than 36 institutions. The Letter of Intent has been accepted in March 94. Expected to begin data taking in FY 1998/99. For more information, please contact the Spokespersons, Dr. Shiro Suzuki [Nagoya U.], Dr. Stephen L. Olsen [Hawaii U.], or Dr. Fumihiko Takasaki [KEK].

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WWW Home-page http://bsunsrv1.kek.jp/

Other KEK Experiments

Listed here are some other KEK experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. Check also the KEK's yearly publication 'Annual Report' for a complete list of active experiments.

KEK-140A (Completed data-taking Mar 1993)

STUDY OF HEAVY HYPERNUCLEI VIA THE (π, K) REACTION USING THE SKS DETECTOR

Spokesperson: O. Hashimoto [Tokyo U., INS]

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KEK-218 (Completed data-taking Feb 1993)

STUDY OF THE FORMATION OF $^{4}_{\Lambda}$H BY USING $\pi\pi$ COINCIDENCE

Spokesperson: H. Tamura [Tokyo U.]

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KEK-224 (Completed data-taking Jan 1992)

SEARCH FOR THE H-DIBARYON WITH A SCINTILLATING FIBER TRACK DETECTOR

Spokesperson: K. Imai [Kyoto U.]

E-mail contact imai@kekvax.kek.jp, kytvax::imai

KEK-228 (Completed data-taking 1995)

PRECISE MEASUREMENT OF THE STRONG INTERACTION SHIFTS OF KAONIC HYDROGEN X-RAYS

Spokesperson: M. Iwasaki [Tokyo U., INS]

KEK-235 (Completed data-taking Apr 1993)

DIFFERENTIAL CROSS-SECTION FOR $p(n,\gamma)d$

Spokesperson: M.A. Kovash [Kentucky U.]

E-mail contact kovash@ie.pa.uky.edu

KEK-248 (Taking data)

SEARCH FOR H PARTICLES IN THE $pp \to K^+K^+$ REACTION

Spokesperson: H. Kawai [Chiba U.]

KEK-251 (Completed data-taking Dec 1992)

HYPERON–NUCLEON SCATTERING EXPERIMENT I: $\Sigma^+ p$ SCATTERING

Spokesperson: M. Ieiri [KEK, Tsukuba]

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KEK-257 (Completed data-taking May 1992)

SUBTHRESHOLD ANTIPROTON PRODUCTION IN d A REACTIONS

Spokesperson: J. Chiba [KEK, Tsukuba]

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KEK-262 (Completed data-taking Nov 1993)

BEHAVIOR OF PIONIC HYDROGEN ATOMS. PART II

Spokesperson: A. Shinohara [Nagoya U.]

KEK-269 (Completed data-taking 1995)

DIFFERENTIAL π C CROSS-SECTION ABOVE THE Δ RESONANCE REGION

Spokesperson: Harutaka Sakaguchi [Kyoto U.]

E-mail contact sakaguchi@kytvax.scphys.kyoto-u.ac.jp

KEK-278 (Completed data-taking Dec 1993)

ASYMMETRY OF NON-MESONIC WEAK DECAY OF POLARIZED $^{5}_{\Lambda}$He

Spokesperson: Tadafumi Kishimoto [Osaka U.]

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KEK-287 (Completed data-taking Jul 1993)

STUDY OF ΛN SPIN–SPIN INTERACTION USING γ SPECTROSCOPY OF HYPERFRAGMENTS

Spokesperson: Hiro Tamura [Tokyo U.]

E-mail contact tamura@tkyvax.phys.s.u-tokyo.ac.jp, tkyvax::tamura

KEK-289 (Taking data)

HYPRON–NUCLEON SCATTERING EXPERIMENT: $\Sigma^- p$ AND Λp SCATTERING

Spokesperson: Masaharu Ieiri [KEK, Tsukuba]

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KEK-307 (Completed data-taking 1995)

LIFETIMES AND WEAK DECAY WIDTHS OF LIGHT AND MEDIUM HEAVY Λ HYPERNUCLEI

Spokesperson: H.C. Bhang [Seoul National U.]

E-mail contact bhang@kekvax.kek.jp

KEK-325 (Taking data)

NUCLEAR MATTER EFFECT ON MESON MASS IN ϕ DECAY

Spokesperson: Hideto Enyo [Kyoto U.]

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KEK-326 (Completed data-taking 1994)

STUDY OF HYPERFRAGMENT PRODUCTION IN ABSORPTION OF STOPPED K^-

Spokesperson: H. Tamura [Tokyo U.]

E-mail contact tamura@tkyvax.phys.s.u-tokyo.ac.jp, tkyvax::tamura

KEK-336 (Taking data)

SPECTROSCOPIC INVESTIGATION OF LIGHT Λ HYPERNUCLEI BY THE (π^+, K^+) REACTION

Spokesperson: O. Hashimoto [Kyoto U.]

E-mail contact hashimot@ins.u-tokyo.ac.jp

KEK-352 (Taking data)

QUASIELASTIC π SCATTERING

Spokesperson: Roy J. Peterson [Colorado U.]

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KEK Future Plans

The interdisciplinary research with the 12-GeV Proton Synchrotron will continue utilizing the proton and light ion beams. The particle physics studies will focus on the long baseline neutrino oscillation experiment with the SuperKamiokande detector, and the time-reversal invariance experiment on the kaon system. Both experiments will need twice (or more) intenser proton beams than presently available, and an accelerator study group is being formed to deal with the new requirements. The TRISTAN collider has been closed, and its tunnel is now used for two rings of the KEK-B (B Factory) asymmetric electron–positron collider (8×3.5 GeV). The machine is scheduled to be commissioned in FY 1998–99, and the design luminosity is 10^{34} cm^{-2}s^{-1}.

Selected LAMPF Experiments

LAMPF-969

(Proposed Jul 1985, Approved Aug 1985, Began data-taking Jun 1992, Completed data-taking 1995)

MEGA — SEARCH FOR THE RARE DECAY $\mu^+ \to e^+\gamma$

MEGA COLLABORATION
UCLA – D Barlow, B M K Nefkens, B Tippens
CHICAGO U – J Crocker, S C Wright
FERMILAB – P S Cooper
HAMPTON U – L Tang
HOUSTON U – M Barakat, Y Chen, M Dzemidzic, A Empl, J Flick, E V Hungerford, K Johnston, K Lan, B W Mayes, R Phelps, L Pinsky, W von Witsch
INDIANA U – J Knott, K M Stantz, J Szymanski
LOS ALAMOS – J F Amann, K Black, R D Bolton, M Brooks, S Carius, M D Cooper (√ Spokesperson), W Foreman, C M Hoffman, G E Hogan, T Kozlowski, M Kroupa, D Lee, G Mills, R E Mischke, F J Naivar, M A Oothoudt, C Pillai, R D Werbeck, D Whitehouse, C Wilkinson
QUEENS U, KINGSTON – A Hallin
STANFORD U – E B Hughes, C Jui, J N Otis, M W Ritter
TEXAS A AND M – C Gagliardi, G Kim, F Liu, R E Tribble, X Tu, L Van Ausdeln, X Zhou
VALPARAISO U, INDIANA – R Fisk, D D Koetke, R W Manweiler, S Stanislaus
VIRGINIA U – R Marshall, B Wright, K O H Ziock
VIRGINIA TECH – D Haim, F Lee, L E Piilonen, Y Zhang, W Zhou
WYOMING U – A R Kunselman
YALE U – K Hahn, J Markey

Accelerator LAMPF *Detector* MEGA

Reactions Polarized beam
$\mu^+ \to e^+ \gamma$ 0 MeV/c (P_{lab})

Particles studied μ^+

Brief description Also searches for a $V+A$ contribution to radiative decay. Approved for 4000 hours. Looks for $\mu^+ \to e^+\gamma$ at a level of 6×10^{-13}, a factor of 80 better than the Crystal Box detector. Took data in 1992/93 and in 1994/95. Data analysis in progress (July 96).

Journal papers NIM A303 (1991) 298, NIM A323 (1992) 198, NIM A349 (1994) 118, and NIM A372 (1996) 195.

Related experiments PSI-R-87-03

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LAMPF-1054

(Proposed Dec 1986, Approved Feb 1987, Began data-taking 1991, Completed data-taking 1996)

ULTRAHIGH PRECISION MEASUREMENTS ON THE MUONIUM GROUND STATE: HYPERFINE STRUCTURE AND MUON MAGNETIC MOMENT

LOS ALAMOS – C Pillai, O van Dyck
HEIDELBERG U, PHYS INST – K Jungmann, I Reinhard, G zu Putlitz (√ Spokesperson)
YALE U – M G Boshier, S Dhawan, X Fei, V W Hughes (√ Spokesperson), D Kawall, W Liu
YALE U & PSI, VILLIGEN – M Janousch
BROOKHAVEN – F Mariam, K Woodle
LIVERMORE – P Egan

Accelerator LAMPF *Detector* Other

Particles studied muonium

Brief description An ultrahigh precision measurement of the muonium hyperfine structure interval $\Delta\nu$ and of the microwave magnetic moment ratio μ_μ/μ_p with the goal of determining $\Delta\nu$ to 10 ppb and μ_μ/μ_p to 60 ppb. Uses the microwave magnetic resonance spectroscopy method with an intense and pure subsurface μ^+ beam, a large superconducting homogeneous solenoid, and a line-narrowing method involving a chopped μ^+ beam. Data analysis in progress (July 96).

Journal papers NIM A333 (1993) 260, and PR A52 (1995) 1948.

Related experiments BNL-821

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LAMPF-1173 (LSND)

(Proposed Jul 1989, Approved Jan 1990, Began data-taking Sep 1993, In progress)

SEARCH FOR $\overline{\nu}_\mu \leftrightarrow \overline{\nu}_e$ OSCILLATIONS WITH HIGH SENSITIVITY

LSND COLLABORATION
UC, RIVERSIDE – R M Gunasingha, K McIlhany, I Stancu, W Strossman, G J VanDalen
UC, SAN DIEGO – W Vernon
UC, SANTA BARBARA – D O Caldwell, M Gray, S Yellin
EMBRY-RIDDLE AERONAUTICAL U – D Smith, J Waltz
UCIIRPA, SLAC – A Eisner, Y Wang
LINFIELD COLL, OREGON – I Cohen
LOS ALAMOS – R Burman, J Donahue, F J Federspiel, G T Garvey, W C Louis (√ Spokesperson), G B Mills, V Sandberg, R Tayloe, D H White
LOUISIANA STATE U – R Imlay, H J Kim, W Metcalf, N Wadia
LOUISIANA TECH U – K Johnston
NEW MEXICO U – B B Dieterle, R Reeder
SOUTHERN U – A Fazely
TEMPLE U – C Athanassopoulos, L B Auerbach, R Majkic, J Margulies, D Works, Y Xiao

Accelerator LAMPF *Detector* LSND

Reactions

$\overline{\nu}_\mu \to \overline{\nu}_e$	< 53 MeV (T_{lab})
$\nu_\mu \to \nu_e$	< 250 MeV (T_{lab})
ν_e C $\to e^-$ nucleon	< 53 MeV (T_{lab})
ν_μ C $\to \mu^-$ nucleon	< 250 MeV (T_{lab})
ν C $\to \nu$ C*	"
$\nu_\mu\ p \to \nu_\mu\ p$	"
$\nu_e\ e^- \to \nu_e\ e^-$	< 53 MeV (T_{lab})

Particles studied ν

Brief description A search for neutrino oscillations to the level $\sin^2\theta = 3 \times 10^{-4}$, where θ represents the mixing angle if there were a two-generation mixing. Uses neutrinos produced by both at-rest and in-flight decaying pions. Neutrinos then interact in a mineral oil (CH_2) target. The detector consists of a tank with 167 tons of liquid scintillator and with 1220 photomultiplier tubes mounted on the inside tank surface. Other physics goals include measurements of neutrino elastic, charged-current, and neutral-current scattering. Taking data (July 96). Will continue the data taking for at least one more year, and possibly for another 5–10 years.

Journal papers NIM A334 (1993) 353, PR C51 (1995) 1065, and PRL 75 (1995) 2650.

Related experiments ISIS-KARMEN

E-mail contact louis@lanl.gov

WWW Home-page
http://darkmatter.linfield.edu/research/neutrino/ neutrino.html

LAMPF-1188

(Proposed 1987, Approved 1987, Began data-taking Oct 1987, In progress)

SEARCH FOR TIME REVERSAL SYMMETRY VIOLATION AND PARITY VIOLATION AT THE PROTON STORAGE RING

LOS ALAMOS – J D Bowman (Spokesperson), C M Frankle, J N Knudson, S Penttila, S J Seestrom, V Yuan

DUKE U – B Crawford, N R Roberson
TRIUMF – P P J Delheij
NORTH CAROLINA STATE U – C R Gould, D G Haase, G E Mitchell, S Patterson
DUBNA – Y Popov, E Sharapov

Accelerator LAMPF *Detector* Counter

Reactions Polarized beam and target

n nucleus	—

Brief description Searches for time reversal and parity violation in low-lying nuclear states. Preliminary results have detected parity violation in states of ^{139}La, ^{165}Ho, ^{232}Th, ^{235}U, and ^{238}U. The neutron beam is 57% polarized from 1 eV to 20 keV. Continues taking data (June 96).

Journal papers PR C39 (1989) 1721, PRL 65 (1990) 1192, PRL 67 (1991) 564, PR C44 (1991) 2187, PR C45 (1992) 2143, PR C46 (1992) 768, PR C46 (1992) 778, PR C46 (1992) 1542, PR C48 (1993) 1116, and PR C48 (1993) 1601.

E-mail contact bowman@lanl.gov

LAMPF-1240

(Proposed Jul 1991, Approved Aug 1991, Began data-taking Aug 1992, Completed data-taking Aug 1993)

MEASUREMENT OF THE MICHEL PARAMETER ρ WITH THE MEGA POSITRON SPECTROMETER

MEGA COLLABORATION
CHICAGO U – S C Wright
FERMILAB – P S Cooper
HOUSTON U – Y Chen, M Dzemidzic, E V Hungerford, K Lan, B W Mayes, L Pinsky, W von Witsch
INDIANA U – J Knott, K M Stantz, J J Szymanski
LOS ALAMOS – J F Amann, R D Bolton, M D Cooper (✓ Spokesperson), W Foreman, R Harrison, G Hart, G E Hogan, T Kozlowski, M A Kroupa, R E Mischke (✓ Spokesperson), C Pillai, S Schilling, D Whitehouse
TEXAS A AND M – C Gagliardi, F Liu, R E Tribble, X L Tu, L A Van Ausdeln
VALPARAISO U, INDIANA – D D Koetke, R W Manweiler, S Stanislaus
VIRGINIA U – B Wright, K O H Ziock
VIRGINIA TECH – D Haim, F Lee, L E Piilonen (✓ Spokesperson), Y Zhang, W Zhou

Accelerator LAMPF *Detector* MEGA

Reactions Polarized beam

$\mu^+ \rightarrow e^+ \nu_e \bar{\nu}_\mu$	28 MeV/c

Brief description An improved measurement of the Michel parameter ρ. Ran for 336 hours. Data analysis in progress (July 96).

Related experiments LAMPF-969

E-mail contact mcooper@lanl.gov, mischke@lanl.gov, piilonen@amy.phys.vt.edu

LAMPF-1268

(Proposed Nov 1992, Approved Jan 1993, Began data-taking Jun 1993, Completed data-taking Sep 1993)

$\pi^- p \rightarrow \pi^0 n$ CROSS-SECTIONS IN THE REGION OF THE Δ RESONANCE

ABILENE CHRISTIAN U – L D Isenhower, J Redmon, M E Sadler (✓ Spokesperson)
ARIZONA STATE U – J R Comfort, C Gaulard
BOŠKOVIĆ INST, ZAGREB – A Marušić, I Supek
CATHOLIC U – H Crannell, L Nguyen
GEORGE WASHINGTON U – W J Briscoe, J Connelley, S Matthews
LOS ALAMOS – J Amann, R Boudrie, J Knudson, C Morris, B Park, M Rawool, R M Whitton
PENN U – P P Hui, D Smith

Accelerator LAMPF *Detector* NMS

Reactions

$\pi^- p \rightarrow \pi^0 n$	138, 166, 190, 215, 237, 263 MeV (T_{lab})

Particles studied $\Delta(1232\, P_{33})$

Brief description Measures the differential cross-sections in the region of the $\Delta(1232)$ resonance. Uses elements of the Neutral Meson Spectrometer (NMS) to measure the two γ-rays from the π^0 decay, eliminating the difficulty of determining the efficiency of neutron counters. The goals are to provide accurate data for input to charge-dependent partial wave analyses, and to study the charge splitting of the Δ.

Related experiments LAMPF-1178

E-mail contact sadler@physics.acu.edu

Other LAMPF Experiments

Listed here are some other LAMPF experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons.

LAMPF-876 (Completed data-taking Oct 1992)

SPIN TRANSFER MEASUREMENTS FOR NEUTRON–PROTON ELASTIC SCATTERING

Spokesperson: Michael W. McNaughton [Los Alamos]

E-mail contact mcnaught@lanl.gov

LAMPF-1178 (Completed data-taking Nov 1995)

POLARIZATION ASYMMETRY MEASUREMENTS FOR ^{1}H$(\pi^-, \pi^0)n$ BETWEEN 45 AND 100 MeV

Spokespersons: Joseph R. Comfort [Arizona State U.], George R. Burleson [New Mexico State U.]

E-mail contact comfort@phyast.la.asu.edu, burleson@nmsu.edu

LAMPF-1179 (Completed data-taking Jul 1992)

REACTION $\pi^+ p \rightarrow \pi^+ \pi^0 p$ NEAR THRESHOLD

Spokesperson: Dinko Počanić [Virginia U.]

E-mail contact pocanic@virginia.edu

WWW Home-page
http://helena.phys.virginia.edu/~pipin/E1179/ E1179.html

LAMPF-1190 (Completed data-taking Jul 1992)

PION–PROTON INTEGRAL CROSS-SECTION MEASUREMENTS

Spokespersons: Robert A. Ristinen [Colorado U.], C.L. Morris [Los Alamos]

E-mail contact ristinen@spectr.colorado.edu

LAMPF-1208 (Taking data)

NEUTRON–PROTON BREMSSTRAHLUNG

Spokesperson: Stephen A. Wender [Los Alamos]

E-mail contact wender@lanl.gov

LAMPF-1213 (Completed data-taking Nov 1995)

MEASUREMENT OF THE NEUTRINO CAPTURE CROSS-SECTION IN ^{127}I WITH μ^+ DECAY NEUTRINOS

Spokesperson: Kenneth Lande [Penn U.]

E-mail contact klande@mail.sas.upenn.edu

LAMPF-1231

LASER POLARIZED MUONIC ATOMS AND SPIN DEPENDENCE OF NUCLEAR MUON CAPTURE

Spokespersons: Gordon D. Cates [Princeton U.], Paul A. Souder [Syracuse U.]

E-mail contact cates@pucc.princeton.edu, souder@suhep.phy.syr.edu

LAMPF-1234 (Completed data-taking Sep 1991)

K_{LL} AND P FOR np ELASTIC SCATTERING

Spokesperson: Michael W. McNaughton [Los Alamos]

E-mail contact mcnaught@lanl.gov

LAMPF-1256 (In preparation)

$\pi^{\pm}p$ ANALYZING POWERS AT 45 AND 67 MeV

Spokespersons: Joseph R. Comfort [Arizona State U.], George R. Burleson [New Mexico State U.]

E-mail contact comfort@phyast.la.asu.edu, burleson@nmsu.edu

LAMPF-1267 (Completed data-taking Oct 1993)

ELASTIC SCATTERING OF π^+ FROM POLARIZED ^{3}He AT T_π = 100, 142, 180, AND 256 MeV

Spokespersons: Dietrich Dehnhard [Minnesota U.], George R. Burleson [New Mexico State U.], Otto F. Haeusser [TRIUMF and Simon Fraser U.]

E-mail contact dehnhard@physics.spa.umn.edu, burleson@nmsu.edu, hausser@triumf.ca

LAMPF-1286 (Completed data-taking Sep 1993)

MEASURING THE NEUTRON–NEUTRON SCATTERING LENGTH AND EFFECTIVE RANGE USING THE ^{2}H$(\pi^-, 2n)\gamma$ REACTION

Spokesperson: Ahmed H. Hussein [Northern British Columbia U.]

E-mail contact hussein@unbc.edu

LAMPF-1293 (Completed data-taking Oct 1993)

np ELASTIC ANALYZING POWER

Spokesperson: Michael W. McNaughton [Los Alamos]

E-mail contact mcnaught@lanl.gov

LAMPF-1309 (Completed data-taking Oct 1993)

ANALYZING POWER AND SPIN TRANSFER MEASUREMENTS IN np INELASTIC CHANNEL

Spokesperson: George Glass [Texas U.]

E-mail contact mp0gg@lampf.lanl.gov

LAMPF-1310

MEASUREMENT OF THE DOUBLY DIFFERENTIAL CROSS-SECTION FOR $\pi^- p \rightarrow \pi^+ \pi^- n$ AT 190 AND 200 MeV AND SOFT PION THEORY

Spokespersons: Glen A. Rebka, Jr. [Wyoming U.], Peter A.M. Gram [Los Alamos], Donald A. Roberts [Michigan U.]

E-mail contact physeh@uwyo.edu, gram@lampf.lanl.gov, droberts@mich1.physics.lsa.umich.edu

LAMPF Future Plans

The LAMPF nuclear and particle physics user program has officially ended. The facility, now called LANSCE (Los Alamos Neutron Science Center) continues to operate with the purpose of providing pulsed neutrons to several research communities. However, particle physics retains its presence at Los Alamos. The LSND neutrino experiment will continue to run for at least several more years. A number of fundamental physics experiments using cold and ultracold neutrons are planned at LANSCE.

NOVOSIBIRSK Experiments

NOVOSIBIRSK-CMD-2

(Proposed 1984, Approved 1985, Began data-taking 1991, In progress)

THE CRYOGENIC MAGNETIC EXPERIMENT

NOVOSIBIRSK, IYF – R R Akhmetshin, G A Aksenov, E V Anashkin, V M Aulchenko, B O Baibusinov, V S Banzarov, L M Barkov, S E Baru, N S Bashtovoi, A E Bondar, D V Chernyak, S I Eidelman, G V Fedotovitch, N I Gabyshev, A A Grebeniuk, D N Grigoriev, B I Khazin (√ Spokesperson), I A Koop, A S Kuzmin, I B Logashenko, P A Lukin, A V Maksimov, Y I Merzlyakov, V S Okhapkin, S G Pivovarov, E V Popkov, T A Purlats, S I Redin, N I Root, A A Ruban, N M Ryskulov, Y M Shatunov, A I Shekhtman, A E Sher, M A Shubin, B A Shwartz, V A Sidorov, A N Skrinsky, V P Smakhtin, I G Snopkov, E P Solodov, P Y Stepanov, A I Sukhanov, V M Titov, Y V Yudin, V G Zavarzin, S G Zverev
BOSTON U – D H Brown, L B Roberts, W Worstell
PITTSBURGH U – J A Thompson
YALE U – S K Dhawan, V W Hughes

Accelerator NOVO-VEPP-2M *Detector* CMD-2

Reactions

$e^+ e^- \rightarrow$ charged$^+$ charged$^-$ (chargeds) (neutrals)	0.36–1.4 GeV (E_{cm})

Particles studied ρ, ω, ϕ

Brief description Measures the hadronic part of the anomalous magnetic moment of the muon. Studies the dynamics of multihadron production and rare decays of vector mesons. The magnetic detector consists of a 1.5 tesla superconducting solenoid, drift chamber, Z-chamber, muon identification system, CsI barrel calorimeter, and BGO endcap calorimeter.

Journal papers NIM A252 (1986) 299, NIM A265 (1988) 137, NIM A283 (1989) 752, NIM A323 (1992) 178, and PL B364 (1995) 199.

Related experiments BNL-821

E-mail contact khazin@inp.nsk.su

WWW Home-page http://www.inp.nsk.su/cmd2/

NOVOSIBIRSK-KEDR

(Proposed 1986, Approved 1987, In preparation)

THE MAGNETIC SPECTROMETER EXPERIMENT

NOVOSIBIRSK, IYF – S Z Akhmadaliev, V V Anashin, V M Aulchenko, B D Baibusinov, L M Barkov, A A Barladyan, S E Baru, I A Bedny, A E Blinov, G A Blinov, V E Blinov, A E Bondar, A D Bukin, A G Chilingarov, S I Eidelman, V R Groshev, G Y Kezerashvili, V A Kiselev, S G Klimenko, G M Kolachev, V N Kozlov, L M Kurdadze, A S Kuzmin, M Y Lelthuk, V M Malyshev, A A Maslennikov, A A Milov, G D Minakov, S I Mishnev, N A Muchnoi, V P Nagaslaev, E I Nekhanevich, A B Nomerotsky, A P Onuchin, V S Panin, S V Peleganchyuk, V V Petrov, G E Pospelov, Y V Pril, I Y Protopopov, T A Purlatz, V A Rodyakin, L V Romanov, N I Root, A V Rylin, G A Savinov, B A Schwartz, A G Shamov, M I Shubin, A I Shusharo, V A Sidorov, Y I Skovpen, A N Skrinsky, V P Smakhtin, A I Sokolov, V A Tayurski, V I Telnov, Y A Tikhonov (√ Spokesperson), G M Tumaikin, A E Undrus, Y V Usov, A I Vorobiev, N I Yakovlev, I A Zagorodnikov, V N Zhilich, A A Zholents
BOLOGNA U & INFN, BOLOGNA – P L Frabetti
MILAN U & INFN, MILAN – F Palombo, A Sala
PAVIA U & INFN, PAVIA – P F Mafredi, V Re, V Speziali

Accelerator NOVO-VEPP-4M *Detector* KEDR

Reactions

$e^+ e^- \rightarrow$ hadrons	<10.0 GeV (E_{cm})
$e^+ e^- \rightarrow \Upsilon(nS)$	"
$e^+ e^- \rightarrow e^+ e^- \gamma$	"
$e^+ e^- \rightarrow e^+ e^-$ hadrons	"
$e^+ e^- \rightarrow e^+ e^- \pi^0$	"
$e^+ e^- \rightarrow e^- e^+ \eta$	"
$e^+ e^- \rightarrow e^- e^+ \eta'$	"
$e^+ e^- \rightarrow e^- e^+ \eta_c(1S)$	"
$e^+ e^- \rightarrow e^+ e^- a_2(1320)$	"
$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^-$	"
$e^+ e^- \rightarrow e^+ e^- f_2(1270)$	"

Particles studied $\Upsilon(1S)$, $\Upsilon(2S)$, $\Upsilon(3S)$, $\Upsilon(4S)$, π^0, η, η', $\eta_c(1S)$, $a_2(1320)$, $f_2(1270)$

Brief description Studies spectroscopy of Υ mesons. Particular attention is paid to a measurement of the two-photon widths of particles. The detector KEDR consists of a vertex detector, drift chambers, aerogel counter, TOF, barrel LKr calorimeter, endcap CSI calorimeter, 2-T superconducting coil, magnet yoke, muon system, and a tagging system for detection of e^+e^- in the two-photon processes. Scheduled to run in 1997.

Journal papers NIM A289 (1990) 468, NIM A315 (1992) 491, and NIM A316 (1992) 8.

E-mail contact tikhonov@inp.nsk.su

WWW Home-page http://www.inp.nsk.su/kedr/

NOVOSIBIRSK-SND

(Proposed 1986, Approved 1987, Began data-taking 1995, In progress)

THE NEUTRAL-SPECTROMETER EXPERIMENT

NOVOSIBIRSK, IYF – M N Achasov, T V Baier, M G Beck, P M Beschastnov, A V Bozhenok, A D Bukin, D A Bukin, S V Burdin, V P Druzhinin, M S Dubrovin, I A Gaponenko, V B Golubev, A V Gritsan, V N Ivanchenko, A A Korol, S V Koshuba, E V Pakhtusova, A A Salnikov, S I Serednyakov (√ Spokesperson), V V Shary, Y M Shatunov, V A Sidorov, Z K Silagadze, A N Skrinsky, Y V Usov, Y S Velikzhanin

Accelerator NOVO-VEPP-2M *Detector* SND

Reactions

$e^+ e^- \rightarrow \pi^0 \gamma$	<1.4 GeV (E_{cm})
$e^+ e^- \rightarrow \eta \gamma$	"
$e^+ e^- \rightarrow \omega \pi^0$	"
$e^+ e^- \rightarrow \phi \pi^0$	"
$e^+ e^- \rightarrow \eta \pi^+ \pi^-$	"
$e^+ e^- \rightarrow 4\gamma$	"
$e^+ e^- \rightarrow 5\gamma$	"
$e^+ e^- \rightarrow e^- e^+ 2\gamma$	"
$e^+ e^- \rightarrow e^- e^+ 3\gamma$	"
$e^+ e^- \rightarrow 2e^- 2e^+$	"
$e^+ e^- \rightarrow 2e^- 2e^+ \gamma$	"
$e^+ e^- \rightarrow$ pions	"
$e^+ e^- \rightarrow$ 2pion γ	"
$e^+ e^- \rightarrow K^+ K^-$, $K_S K_L$	"

Particles studied K^+, K^-, K^0, ρ, ω, $f_0(975)$, $a_0(980)$, ϕ

Brief description Studies radiative and rare decays of vector mesons, nonresonant hadronic production, and neutral kaon decays. Tests quantum electrodynamics. The Spherical Neutral Detector (SND) consists of 1680 NaI(Tl) counters and provides a good tool to study multiphoton events. The integrated luminosity reached 2 pb^{-1} in the ϕ region as of June 96.

Journal papers YF 56-11 (1993) 75, NIM A342 (1994) 477, and NIM A361 (1995) 138.

Related experiments NOVOSIBIRSK-ND

E-mail contact serednyakov@inp.nsk.su

WWW Home-page http://www.inp.nsk.su/snd/

Selected PNPI Experiments

PNPI-SC-147

(Proposed Jun 1990, Approved Jun 1990, Began data-taking Nov 1992, In progress)

STUDY OF BINARY $\pi^- p$ REACTIONS WITH NEUTRAL PARTICLES IN THE FINAL STATE IN THE REGION OF $N(1440\ P_{11})$ AND $N(1535\ S_{11})$ RESONANCES

PNPI-UCLA-ACU COLLABORATION
ST PETERSBURG, INP – V V Abaev, V S Bekrenev, E A Filimonov, A B Gridnev, M R Kan, N G Kozlenko, S P Kruglov, L V Lapochkina, I V Lopatin (√ Spokesperson), D V Novinsky, A B Starostin, V V Sumachev
UCLA – R M Clajus, B M K Nefkens
ABILENE CHRISTIAN U – L D Isenhover, M E Sadler

Accelerator PNPI *Detector* Counter

Reactions

$\pi^- p \to n\,\eta$	665–715 MeV/c
$\pi^- p \to n\,\pi^0$	500–750 MeV/c

Brief description Measurements of DCS for the reaction $\pi^- p \to \pi^0 n$ in the region of $N(1440\ P_{11})$ and $N(1535\ S_{11})$ resonances, and at the η production threshold are underway. Uses four neutron counters in coincidence with two total absorption γ detectors. The detectors are made of Čerenkov lead glass blocks and CsI(Na) crystals.

Journal papers PTE 1 (1995) 15, and FBS SUPPL 9 (1995) 241.

E-mail contact lopatin@lnpi.spb.su

Other PNPI Experiments

Listed here are some other PNPI experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons.

PNPI-SC-124 (Completed data-taking Aug 1991)

MEASUREMENT OF THE SPIN ROTATION PARAMETERS R AND A IN $\pi^- p$ ELASTIC SCATTERING IN THE REGION OF LOW-LYING PION-NUCLEON RESONANCES

Spokesperson: S.P. Kruglov [St. Petersburg, INP]

E-mail contact kruglov@lnpi.spb.su

PNPI-SC-129 (Completed data-taking 1992)

MEASUREMENT OF VECTOR ANALYZING POWER iT_{11} IN REACTION $\pi^- d \to pp$ AT THE PION KINETIC ENERGY REGION 350–450 MeV

Spokesperson: A.N. Prokofiev [St. Petersburg, INP]

E-mail contact prokan@lnpi.spb.su

Selected PSI Experiments

PSI-R-87-01

(Proposed Nov 1986, Approved Jan 1987, Began data-taking Dec 1988, Completed data-taking 1993)

PRECISION MEASUREMENT OF THE MUON MOMENTUM IN PION DECAY AT REST

PSI, VILLIGEN – M Daum, R Frosch (√ Spokesperson), P Gheno, R Horisberger, M Janousch, P-R Kettle, C Wigger
VIRGINIA U – K Assamagan
ZURICH, ETH – H Forrer
ZURICH U – C Broennimann, T Spirig

Accelerator PSI *Detector* Spectrometer

Reactions

$\pi^+ \rightarrow \mu^+ \nu_\mu$ 0 MeV/c

Particles studied ν_μ, π^+

Brief description Uses a surface muon beam and a magnetic spectrometer. Ran for approximately 10 weeks and measured the muon momentum to better than 4 ppm. The measurement gives an upper limit on the ν_μ mass and determines the π^+ mass.

Journal papers PL B265 (1991) 425, PL B335 (1994) 231, and PR D53 (1996) 6065.

E-mail contact manfred.daum@psi.ch

PSI-R-87-03

(Proposed Nov 1986, Approved Jan 1987, Began data-taking 1989, In progress)

SEARCH FOR $\mu^- \rightarrow e^-$ CONVERSION WITH SINDRUM II

SINDRUM-II COLLABORATION
AACHEN, TECH HOCHSCH, III PHYS INST – G Cahsor, J Kaulard, J Kuth, G Otter, A Schnengel
PSI, VILLIGEN – W Bertl, J Egger, D Renker, J Zichy
SWIERK, INST ATOMIC ENERGY – T Kozlowski
ZURICH U – R Engfer, E A Hermes, H S Pruys, F Riepenhausen, M Rutsche, A van der Schaaf (√ Spokesperson), P Wintz

Accelerator PSI *Detector* SINDRUM-II

Reactions

μ^- nucleus $\rightarrow e^-$ nucleus 0 MeV/c (P_{lab})

Particles studied μ^-

Brief description The goal is to study the neutrinoless $\mu^- \rightarrow e^-$ conversion in a muonic atom, which is a test of lepton flavor conservation. Data were taken on Ti in 1989 (results are published), on Pb in 1992, and on Ti again in 1993. With the new beamline which will become available by 1997, the sensitivity is expected to reach 10^{-14}. Active (July 96).

Journal papers NIM A327 (1993) 378, PL B317 (1993) 631, and PRL 76 (1996) 200.

Related experiments LAMPF-969

E-mail contact vanderschaaf@psi.ch

WWW Home-page
http://www1.psi.ch/www_sindrum2_hn/sindrum2.html

PSI-R-89-01

(Proposed Jan 1989, May 1991, Approved Jan 1992, In preparation)

A PRECISE MEASUREMENT OF THE $\pi^+ \rightarrow \pi^0 e^+ \nu$ DECAY RATE

PIBETA COLLABORATION
VIRGINIA U – E Frlež, J E Koglin, J S McCarthy, R C Minehart, B E Norum, D Počanić (√ Spokesperson), S Ritt, P L Slocum, L C Smith, W A Stephens, B K Wright, K O H Ziock
PSI, VILLIGEN – M Daum, T Flugel, R Frosch, R Horisberger, B R Krause, D Renker, R Schnyder
PSI, VILLIGEN & ZURICH U – C Broennimann
SOLTAN INST, SWIERK – T Kozlowski
ARIZONA STATE U – D W Lawrence, B G Ritchie
DUBNA – V A Baranov, V V Karpukhin, N V Khomutov, I V Kisel, A S Korenchenko, S M Korenchenko, N P Kravchuk, N A Kuchinsky, A Moiseenko
TBILISI STATE U – Y Bagaturia, D Mzhavia, T Sachelashvili, Z Tsamalaidze
BOŠKOVIĆ INST, ZAGREB – N Soić, I Supek

Accelerator PSI *Detector* Calorimeter, Wire chamber, Counter

Reactions

$\pi^+ \rightarrow \pi^0 e^+ \nu$ 0 MeV/c
$\pi^+ \rightarrow e^+ \nu$ "
$\pi^+ \rightarrow e^+ \nu \gamma$ "

Particles studied π^+

Brief description The aim is to determine the branching ratio for the $\pi^+ \rightarrow \pi^0 e^+ \nu$ decay to about 0.5% accuracy. The apparatus is a stopped-pion detector system designed to observe the two γ's from the π^0 decay, as well as the e^+. Uses a 0.75 × 4π pure-CsI calorimeter (consisting of 240 crystals) with a good energy resolution, MWPC's, and counters. Target is active and consists of 77 plastic scintillation fibers 3 × 3 mm^2. Development runs are scheduled for 1996. Data taking is expected in late 1997.

Related experiments LAMPF-032

E-mail contact pocanic@virginia.edu, ritt@psi.ch

WWW Home-page http://pibeta.psi.ch/

PSI-R-89-06

(Proposed Mar 1990, Approved Apr 1990, Began data-taking Jul 1992, In progress)

SEARCH FOR SPONTANEOUS CONVERSION OF MUONIUM TO ANTIMUONIUM

HEIDELBERG U, PHYS INST – A Grossmann, D Hubl, K Jungmann (√ Spokesperson), J Merkel, V Meyer, I Reinhard, P V Schmidt, K Trager, L Willmann, G zu Putlitz
ZURICH U – R Engfer
PSI, VILLIGEN – R Abela, D Renker, H K Walter
DUBNA – V Baranov, V Karpuchin, I Kisel, A S Korenchenko, S M Korenchenko, N P Kravchuk, N Kuchinsky, A Moiseenko
TBILISI STATE U – J Bagaturia, D Mzavia, T Sakelashvili
YALE U – V W Hughes

Accelerator PSI *Detector* SINDRUM

Reactions

$\mu^+ e^- \rightarrow \mu^- e^+$ 25 MeV/c (P_{lab})

Particles studied μ^+, muonium

Brief description Studies lepton number violation. The μ^- meson is detected by its decay electron, the atomic e^+ is directly detected after acceleration by 8 kV. The reaction $\mu^+ \rightarrow e^+ e^- e^+ \nu\bar{\nu}$ is also studied. Target is the SiO_2 powder. First data were taken in 1992/93. Expected to run till the end of 1996.

Related experiments LAMPF-1073

E-mail contact jungmann@physi.uni-heidelberg.de

WWW Home-page
http://www1.psi.ch/www_mmbar_hn/mmbar.html

PSI-R-94-01

(Proposed Dec 1993, Approved Dec 1993, Began data-taking Jun 1994, In progress)

FEASIBILITY STUDY TO DETERMINE THE $\pi - \mu$ MASS RATIO

IOANNINA U – D F Anagnostopoulos
JULICH, FORSCHUNGSZENTRUM – G Borchert, H Gorke, D Gotta (✓ Spokesperson), S Lenz, O W B Schult
PARIS, CURIE UNIV VI, LPAN – P El Khoury, P Indelicato
PSI, VILLIGEN – M Daum, R Frosch, P Hauser, K Kirch, L M Simons
NEUCHATEL U – M Augsburger, D Chatellard, J P Egger, E Jeannet

Accelerator PSI *Detector* Spectrometer

Particles studied π^-, μ^-

Brief description Studies X-rays from muonic nitrogen, muonic oxygen, and pionic nitrogen. Uses a bent crystal spectrometer. Aims to determine the π^- mass to ± 1 ppm. Taking data (July 96).

E-mail contact gotta@ikpd01.ikp.kfa-juelich.de

PSI-R-94-10

(Proposed May 1995, Approved Jun 1995, In preparation)

MEASUREMENT OF THE TRANSVERSE POLARIZATION OF POSITRONS FROM THE DECAY OF POLARIZED MUONS

ZURICH, ETH – I Barnett, C Bee, D Conti, W Fetscher (✓ Spokesperson), M Hadri, S Kistryn, J Lang, O Naviliat, J Sromicki, E Stephan
JAGELLONIAN U – K Bodek, L Jarczyk, J Smyrski, A Strzalkowski, J Zejma

Accelerator PSI *Detector* Drift chamber, Counter

Reactions Polarized beam

$\mu^+ \rightarrow e^+ \nu_e \overline{\nu}_\mu$ 125 MeV/c (P_{lab})

Particles studied e^+

Brief description Measures two transverse polarization components, P_{T1} and P_{T2} of the positron, as a function of the e^+ energy, with an expected precision of 3×10^{-3}. This could improve by an order of magnitude the results of a previous PSI measurement of the two components, and provide a tighter limit both for the violation of time reversal and on the value of the low-energy parameter η which is used in the determination of the Fermi coupling constant G_F. Uses a high-intensity polarized muon beam, and a set of drift chambers, plastic counters, and a BGO array.

E-mail contact wulf.fetscher@psi.ch

PSI-R-95-03

(Proposed Nov 1994, Approved Dec 1994, Began data-taking Sep 1995, In progress)

KINETIC ENERGY OF $(\pi^- p)$ ATOMS IN LIQUID AND GASEOUS HYDROGEN

PSI, VILLIGEN – M Daum (✓ Spokesperson), W Hajdas, P-R Kettle, V Markushin, J Schottmueller
ZURICH, ETH – R Badertscher, P F A Goudsmit, M Janousch, Z G Zhao

Accelerator PSI *Detector* Counter, Calorimeter

Reactions

$\pi^- p \rightarrow \pi^0 n$ 0 MeV/c (P_{lab})
$\pi^- p \rightarrow \gamma n$ "

Brief description Measures the time-of-flight of neutrons over various flight-path lengths (from 1 to 12 m, and possibly more) to determine the kinetic energy distribution of pionic atoms under varying pressure conditions. The same data will also be used to determine the mass difference between π^- and π^0 with improved precision. The detection apparatus consists of counters and a NaI calorimeter.

E-mail contact manfred.daum@psi.ch

PSI-R-96-05

(Proposed Apr 1996, Approved Jun 1996, Began data-taking 1996, In progress)

SEARCH FOR A NEUTRAL PARTICLE OF MASS = 33.9 MeV IN PION DECAY

PSI, VILLIGEN – M Daum (✓ Spokesperson), P-R Kettle, B Krause, J Schottmueller, O Wilhelm
PSI, VILLIGEN & VIRGINIA U – S Ritt
TUBINGEN U – K Foehl
ZURICH, ETH – M Janousch, Z G Zhao

Accelerator PSI *Detector* Scintillator

Reactions

$\pi^+ \rightarrow \mu^+ X$ 100–150 MeV/c (P_{lab})

Brief description Measures the muon momentum distribution in charged pion decay in flight, in order to search for a small branching fraction η of pion decays $\pi^+ \rightarrow \mu^+ X$, in which a heavy neutral particle X, with a mass of 33.9 MeV would be emitted. Such a particle may have been observed recently by the KARMEN Collaboration.

Journal papers PL B361 (1995) 179.

Related experiments ISIS-KARMEN

E-mail contact manfred.daum@psi.ch

Other PSI Experiments

Listed here are some other PSI experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. Check also the yearly publication 'PSI Annual Report – Annex I'.

PSI-R-85-13-3 (Completed data-taking Aug 1994)

MEASUREMENT OF ELASTIC $\pi^{\pm} p$ SCATTERING BELOW 100 MeV

By LEPS Collaboration

Spokespersons: W. Kluge [Karlsruhe U., IEKP], H. Clement [Tubingen U.]

E-mail contact wolfgang.kluge@physik.uni-karlsruhe.de

PSI-R-86-05 (Completed data-taking Aug 1994)

CRYSTAL DIFFRACTION OF PIONIC HYDROGEN AND DEUTERIUM X-RAYS

Spokespersons: J.P. Egger [Neuchatel U.], A. Badertscher [Zurich, ETH]

E-mail contact jean-pierre.egger@iph.unine.ch, andreus.badertscher@psi.ch

PSI-R-87-12 (Completed data-taking 1995)

$n\,p$ ELASTIC SCATTERING: AN EXPERIMENT WITH POLARIZED NEUTRONS

Spokesperson: H. Schmitt [Freiburg U.]

E-mail contact hschmitt@uni-freiburg.de

PSI-R-89-03 (Taking data)

PIONIC DOUBLE CHARGE EXCHANGE AT LOW ENERGIES

Spokesperson: H. Clement [Tubingen U.]

E-mail contact clement@pit.physik.uni-tuebingen.de

PSI-R-91-08 (Completed data-taking Jul 1993)

MEASUREMENT OF THE STOPPING POWER FOR MUONS (μ^-, μ^+) AT ENERGIES BETWEEN 2 AND 40 keV

Spokespersons: F.J. Hartmann [Munich, Tech. U.], D. Taqqu [PSI, Villigen]

E-mail contact taqqu@cvax.psi.ch

PSI-R-92-08 (Completed data-taking Sep 1992)

MEASUREMENT OF THE PRODUCTION OF THERMAL MUONIUM IN VACUUM FROM SILICA AEROGELS

Spokespersons: K. Jungmann, B. Matthias [Heidelberg U., Phys. Inst.]

PSI-R-93-06 (In preparation)

MEASUREMENT OF THE $3d - 3p$ TRANSITION IN MUONIC HYDROGEN WITH A COMPACT WAVEGUIDE FREE-ELECTRON LASER

By MUH Collaboration

Spokesperson: E. Zavattini [Trieste U.]

E-mail contact milotti@dfists.ts.infn.it

PSI-R-95-08 (Taking data)

SPIN DEPENDENCE OF PION PRODUCTION IN NEUTRON–PROTON COLLISIONS

Spokespersons: H. Schmitt [Freiburg U.], M. Finger [Charles U. and Dubna, JINR]

E-mail contact hschmitt@uni-freiburg.de

PSI-R-95-09

MEASUREMENT OF THE DESTRUCTIVE INTERFERENCE OF s AND p WAVE IN $\pi^- p$ ELASTIC SCATTERING AT 180°

Spokesperson: M. Janousch [Zurich, ETH]

E-mail contact markus.janousch@psi.ch

PSI-Z-89-02 (Completed data-taking Jun 1991)

NEUTRON MAGNETIC FORM-FACTOR

Spokesperson: Juerg Jourdan [Basel U.]

E-mail contact jourdan@urz.unibas.ch

PSI-Z-89-06 (Completed data-taking 1991)

SPIN DEPENDENT TOTAL CROSS-SECTION $\Delta\sigma_L$ IN np SCATTERING

Spokesperson: P. Haffter [Basel U.]

E-mail contact jourdan@urz.unibas.ch

PSI-Z-89-07 (Completed data-taking 1991)

$\vec{n}p$ RADIATIVE CAPTURE

Spokesperson: G.S. Masson [Basel U.]

E-mail contact masson@urz.unibas.ch

PSI-Z-90-07 (Taking data)

SEARCH FOR EXTENSIONS OF THE STANDARD MODEL BY A RELATIVE β-POLARIZATION MEASUREMENT FROM POLARIZED NUCLEI

Spokesperson: Oscar Naviliat-Cuncic [Zurich, ETH]

E-mail contact naviliat@imp.phys.ethz.ch

PSI-Z-90-12 (Taking data)

DEVELOPMENT OF A SUPERCONDUCTING NEUTRINO AND DARK MATTER DETECTOR

Spokesperson: Klaus Pretzl [Bern U.]

E-mail contact pretzl@cernvm.cern.ch

PSI-Z-91-02 (Completed data-taking 1992)

MEASUREMENT OF THE NEUTRON–PROTON SPIN CORRELATION PARAMETER AT FORWARD ANGLES

Spokesperson: Benny Zihlmann [Basel U.]

E-mail contact zihlmann@urz.unibas.ch

PSI Future Plans

PSI plans to continue its development and operation of large, complex accelerator facilities. The Spallation Neutron Source (SINQ) will begin operations shortly, and other facilities, *e.g.*, the Swiss Light Source (SLS) are in the planning stage. Although the emphasis placed earlier on nuclear and particle physics has shifted more towards solid state physics and materials sciences over the last few years, the nuclear/particle physics programs can benefit largely from the diversification of accelerator usage. Accordingly, new large particle physics experiments (*e.g.*, the rare decay experiments such as $\mu \to e\gamma$), are envisaged in the long term plans at PSI. The near-future plans include a continuing study of rare decays and exotic atoms, the μSR experiments, as well as the exploitation of very slow muons.

Selected SATURNE Experiments

SATURNE-186

(Proposed Oct 1987, Approved Dec 1987, Began data-taking 1988, Completed data-taking 1993)

STUDY OF HEAVY MESON PRODUCTION IN REACTIONS $pd \rightarrow {}^3\mathrm{He}X$ AND $dd \rightarrow {}^4\mathrm{He}X$

STRASBOURG, CRN – O Bing, F Hibou
SACLAY – J Arvieux, M Boivin, J M Durand, F Plouin
ORSAY, IPN – L Bimbot, M P Comets, P Courtat, Y Le Bornec (Spokesperson), E Loireleux, F Reide, B Tatischeff, N Willis

Accelerator SATURNE-II *Detector* SPES-III

Reactions

p deut $\rightarrow {}^3$He X	900 – 2700 MeV (T_{lab})
deut deut $\rightarrow {}^4$He X	1150 – 2150 MeV (T_{lab})

Particles studied deut, ^{3}He, ^{4}He, meson

Brief description Studies the heavy meson production at proton energies between 900 and 2700 MeV, and deuteron energies 1150 and 2150 MeV. Measures the angular distribution.

Journal papers Paper to be published soon.

Related experiments SATURNE-253

E-mail contact le_bornec@ipncls.in2p3.fr

SATURNE-198

(Proposed Mar 1988, Approved Dec 1988, Began data-taking Nov 1990, Completed data-taking 1991)

MEASUREMENTS OF SOME RARE DECAY MODES OF THE η

SACLAY – A Baldisseri, A Boudard, B Fabbro, M Garcon, W Jacobs, C Kerboul, B Mayer (√ Spokesperson), J Poitou, J Saudinos, E Tomasi, S Vigdor, F Wellers
UCLA – R Kessler, B M K Nefkens (√ Spokesperson), B Tippens, M Wang
ZURICH U – E A Hermes, C Niebuhr, A van der Schaaf
GEORGE WASHINGTON U – W Briscoe, A Petrov
TRIUMF – R Abegg, W T H van Oers
DUBNA – L Lytkin

Accelerator SATURNE-II *Detector* SPES-II

Reactions

p deut $\rightarrow {}^3$He η	$>$ 896 MeV (T_{lab})

Particles studied η

Brief description Measures the η branching ratio to $\mu^+\mu^-$ with 12% accuracy. The muons are detected by a two-range telescope. Events are identified by using constraints like coplanarity, angular correlation, total energy conservation, and the invariant mass of the two muons.

Journal papers PRL 70 (1993) 892, PR D50 (1994) 92, PR C53 (1996) 2068, and PR D53 (1996) 6658.

Related experiments SATURNE-258

E-mail contact mayer@phnx7.saclay.cea.fr, bnefkens@uclapp.physics.ucla.edu

SATURNE-209

(Proposed Mar 1989, Approved 1989, Began data-taking 1990, Completed data-taking Nov 1991)

CROSS-SECTION AND ASYMMETRIES FOR THE $pp \rightarrow pp\pi^0$ REACTION FROM THRESHOLD TO 1 GeV

BONN U – G Anton, J Arends, M Breuer, K Buchler, P Hoffmann-Rothe, G Noeldeke
SOUTH CAROLINA U – G Blanpied (√ Spokesperson), B Preedom
ORSAY, IPN – G Berrier-Ronsin, J P Didelez (√ Spokesperson), A Elayi, R Frascaria, E Hourani (√ Spokesperson), G Rappenecker, M Rigney, L Rosier
SACLAY – J M Laget, B Saghai

Accelerator SATURNE-II *Detector* SPES-0

Reactions Polarized beam

$p\,p \rightarrow p\,p\,\pi^0$	325–1000 MeV (T_{lab})

Brief description Measures the differential, total cross-sections and beam asymmetries for the π^0 emitted in the reaction, from threshold to 1000 MeV. Uses the SPES0-2π Neutral Meson Spectrometer and a liquid H_2 target with polarized protons as projectiles.

Journal papers NP A590 (1995) 763.

Related experiments SATURNE-129, SATURNE-132, SATURNE-134, SATURNE-155

E-mail contact didelez@ipncls.in2p3.fr

SATURNE-213

(Proposed 1989, Approved 1989, Began data-taking 1994, In progress)

MEASUREMENT OF SPIN DEPENDENT OBSERVABLES IN THE REACTION $pp \rightarrow pK^+Y^*$

DISTO COLLABORATION
INDIANA U – L C Bland, S Choi, M Dzemidzic, W W Jacobs, S E Vigdor
TURIN U & INFN, TURIN – F Balestra, S Bossolasco, M P Bussa, L Fava, L Ferrero, R Garfagnini, A Grasso, A Maggiora, D Panzieri, G Piragino, F Tosello, G Zosi
DUBNA – I Falomkin, V Frolov, V Ivanov, G B Pontecorvo, A Popov, V Tchalyshev, B Zalikhanov
SACLAY – Y Bedfer, R Bertini (√ Spokesperson), F Brochard, J C Faivre, A Manara
DARMSTADT, GSI – M Debowski, P Senger
CRACOW & JAGELLONIAN U – J Foryciarz, P Salabura
GIESSEN U – A Brenschede, W Kuhn, H Pfaff
FRANKFURT U – J Stroth
ROSSENDORF, FORSCHUNGSZENTRUM – E Grosse
TRIUMF – D Gill

Accelerator SATURNE-II *Detector* DISTO

Reactions Polarized beam

$p\,p \rightarrow p\,K^+\,\Lambda$	2.0, 2.5, 2.85 GeV (T_{lab})
$p\,p \rightarrow p\,K^+\,\Sigma^0$	"
$p\,p \rightarrow p\,K^+\,Y^*$(unspec)	2.85 GeV (T_{lab})
$p\,p \rightarrow p\,p\,K^+\,K^-$	"
$p\,p \rightarrow p\,p\,K^+\,K^-\,\phi$	"

Brief description The experiment measures differential cross-sections and spin-dependent observables (analyzing power, polarization and depolarization) between the threshold and the highest energy available at SATURNE-II. Studies a correlation between the measured observables and N^* and Y^* resonances. Uses a liquid hydrogen target. The detector, DISTO, consists of a magnet, scintillating fiber detectors, MWPC's, scintillation hodoscope and a water Cerenkov hodoscope. In the next year's run, a replacement of the liquid hydrogen target by a nuclear target is envisaged in order to study the interaction of Y and Y^* with nuclear matter. Taking data (July 96).

Journal papers NP A585 (1995) 265c.

E-mail contact bertini@frcpn11.in2p3.fr

WWW Home-page
http://www.to.infn.it/esperimenti/disto/disto.html

SATURNE-220

(Proposed Jun 1990, Approved Dec 1990, Began data-taking Mar 1991, Completed data-taking 1991)

SEARCH FOR THE EXCITATION OF THE ROPER RESONANCE (1440) BY INELASTIC SCATTERING OF α PARTICLES

SACLAY – M Boivin, H P Morsch (Spokesperson), F Plouin, B Saghai, J Yonnet, P Zupranski
ORSAY, IPN – J P Didelez, R Frascaria (Spokesperson), M Morlet, R Siebert, E Warde
JULICH, FORSCHUNGSZENTRUM & STOCKHOLM U – P E Tegner

Accelerator SATURNE-II *Detector* SPES-IV

Reactions

^{4}He $p \rightarrow {}^4$He X	4.2 GeV (T_{lab})

Particles studied N^*(unspec), $N(1440\,P_{11})$

Brief description Studies the baryon excitation in the α p system, from the pion threshold up to the Roper resonance. Uses the α beam up to 7 GeV/c. Inelastically scattered alpha particles are detected by the SPES-IV spectrometer. Uses LH2 target.

Journal papers PRL 69 (1992) 1336, and ZPHY A348 (1994) 45.

Related experiments SATURNE-251

E-mail contact morsch@frcpn11.in2p3.fr, frascaria@ipncls.in2p3.fr

SATURNE-222

(Proposed Nov 1989, Approved 1989, Began data-taking 1990, Completed data-taking 1993)

MESON PRODUCTION NEAR THRESHOLD FROM THE ϕ TO THE $f_1(1285)$

ORSAY, IPN – J P Didelez, M A Duval, R Frascaria, M Morlet, R Siebert (Spokesperson), E Warde
SACLAY – J Arvieux, F Plouin
BONN U – J Bisplinghoff, J Ernst, F Hinterberger, R Jahn (Spokesperson), R Joosten, U Lahr, C Lippert, A Marx, R Wurzinger

Accelerator SATURNE-II *Detector* SPES-IV

Reactions

p deut $\rightarrow {}^3$He X	—

Particles studied ϕ, $f_1(1285)$

Brief description Extends and refines existing measurements of the threshold excitation curve of meson production. An increasing degree of exclusivity is achieved by adding scintillator arrays to the SPES-IV detector. In the second phase, during 1992/93, the regions around the K^+K^0 threshold, and above 1.9 GeV, are explored in 100-MeV steps.

Journal papers PR C51 (1995) 443.

E-mail contact siebert@ipncls.in2p3.fr

SATURNE-225

(Proposed Dec 1989, Approved Jun 1991, Began data-taking Nov 1991, Completed data-taking Apr 1995)

DETERMINATION OF THE NUCLEON–NUCLEON SCATTERING AMPLITUDES IN THE ENERGY REGION FROM 1.1 TO 2.7 GeV AND A SEARCH FOR A STRUCTURE AROUND T_{kin} = 2.1 GeV

NUCLEON-NUCLEON COLLABORATION
SACLAY – J Arvieux, J Ball (√ Spokesperson), J Bystricky, P A Chamouard, M Combet, A de Lesquen, M de Mali, J M Fontaine (√ Spokesperson), R Kunne, J M Lagniel, F Lehar, J L Lemaire, J L Sans
GENEVA U – P Demierre, R Hess, Z F Janout, Jr , D Rapin (√ Spokesperson), A Teglia, B Vuaridel
ARGONNE – C Allgower, M Beddo, D Grosnick, T Kasprzyk, D Lopiano, H Spinka (√ Spokesperson)
DUBNA – L S Barabash, V A Kalinnikov, Y M Kazarinov, B A Khachaturov (√ Spokesperson), V N Matafonov, I L Pisarev, A A Popov, Y A Usov
DUBNA & PRAGUE, TECH U – Z Janout
ST PETERSBURG, INP – A N Prokofiev, V Vikhrov, A A Zhdanov
UCLA – A Boutefnouchet, C M Dulya, V Ghazikhanian, S Trentalange, C A Whitten
MIT, LNS – E L Lomon

Accelerator SATURNE-II *Detector* Combination

Reactions Polarized beam and target

$p\,p \rightarrow p\,p$	1.1 – 2.8 GeV (T_{lab})
$p\,n \rightarrow p\,n$	1.1 – 2.4 GeV (T_{lab})

Particles studied p, n

Brief description Uses a polarized proton beam and polarized proton and deuteron targets. Measures the complete sets of spin-dependent observables in pn quasielastic scattering between 1.1 and 2.4 GeV. Dedicated pp spin-dependent observables are measured between 1.8 and 2.8 GeV in small steps of energy. The measuring apparatus consists of a two-arm spectrometer, one arm being a polarimeter, and two large neutron-counter hodoscopes. The direction of beam polarization is measured by three additional beam polarimeters. Data analysis in progress (July 96).

Journal papers NIM A327 (1993) 308, and PL B320 (1994) 206.

Related experiments SATURNE-144, SATURNE-216

E-mail contact ball@frcpn11.in2p3.fr, jmfont@frcpn11.in2p3.fr, hms@hep.anl.gov, khachaturov@main1.jinr.dubna.su

SATURNE-237

(Proposed Nov 1990, Approved Jan 1991, Began data-taking Jul 1991, Completed data-taking 1995)

STUDY OF THE $pp \rightarrow pp\eta$ AND (p,η) REACTIONS ON NUCLEI AT $T_p > 1.26$ GeV

PINOT COLLABORATION
TURIN U & INFN, TURIN – E Chiavassa, N De Marco (Spokesperson), C De Oliveira Martins, G Dellacasa, F Ferrero, M Gallio, P Guaita, A Musso, A Piccotti, E Scomparin, E Vercellin (Spokesperson)
SACLAY – J M Durand, G Milleret

Accelerator SATURNE-II *Detector* PINOT

Reactions

$p\,p \rightarrow p\,p\,\eta$	>1.26 GeV (T_{lab})
p nucleus $\rightarrow \eta$ X	"
p deut $\rightarrow \eta$ X	"

Particles studied η

Brief description The aim is to study the first two reactions near the threshold by detecting η mesons with the two-arm neutral meson spectrometer, PINOT. For the first reaction the total and doubly differential cross-section $d^2\sigma/d\Omega dT$ is measured. The (p,η) reaction on nuclei is studied at the same incident energies by measuring the η kinetic energy distributions for η's emitted forward in the laboratory. Also investigates the $pd \rightarrow \eta X$ reaction in order to extract information on the $pn \rightarrow \eta X$ elementary process, by comparing pd and pp induced reactions. Uses the following targets: liquid H_2 and D_2, C, Al, Cu, Mo, W, Au, and Ti. Data analysis in progress (July 96).

Journal papers NP A538 (1992) 121c, ZPHY A342 (1992) 107, JPHY G19 (1993) L51, NC 106A (1993) 861, ZPHY A344 (1993) 345, NC 107A (1994) 1195, PL B322 (1994) 270, and PL B337 (1994) 192.

Related experiments SATURNE-125

E-mail contact demarco@to.infn.it, vercellin@to.infn.it

SATURNE-251

(Proposed Nov 1992, Approved Dec 1992, Began data-taking Mar 1993, Completed data-taking Oct 1993)

SEARCH FOR THE EXCITATION OF THE ROPER RESONANCE (1440) IN NUCLEI

SACLAY – M Boivin, J L Boyard (Spokesperson), F Fuchs, R Kunne, H P Morsch (Spokesperson), F Plouin, P Radvanyi, W Spang
ORSAY, IPN – T Hennino, J C Jourdain, B Ramstein, M Roy-Stephan, S Rusteau
JULICH, FORSCHUNGSZENTRUM – V Jaeckle
WARSAW U – P Zupranski
STOCKHOLM U – P E Tegner
RENSSELAER POLY – L Murphy, P Stoler

Accelerator SATURNE-II *Detector* SPES-IV

Reactions

^{4}He deut → ^{4}He X	4.2 GeV/c
^{4}He ^{12}C → ^{4}He X	"

Particles studied $N(1440\,P_{11})$

Brief description Studies the spectrum of alpha particles. Searches for the excitation of the Roper resonance. Uses LD2, solid C, and CH_2 targets. Data analysis in progress (July 96).

Related experiments SATURNE-220

E-mail contact boyard@frcpn11.in2p3.fr, morsch@frcpn11.in2p3.fr

SATURNE-258

(Proposed Nov 1992, Approved Dec 1992, Began data-taking 1993, Completed data-taking 1993)

DIRECT MEASUREMENT OF THE BRANCHING RATIO IN THE $\eta \to \gamma\gamma$ DISINTEGRATION

ETA COLLABORATION
SACLAY – A Boudard, J M Durand, B Fabbro, M Garcon (√ Spokesperson), B Mayer, J F Pillot, E Thomasi-Gustafsson
DUBNA – A Efendiev, L Lytkin (√ Spokesperson)
UCLA – M Clajus (√ Spokesperson), B Nefkens, D White
PSI, VILLIGEN – R Abela
TRIUMF – R Abegg, P Fuchs, W T H van Oers
GEORGE WASHINGTON U – W Briscoe, T Morrison
ST PETERSBURG, INP – V Nikulin

Accelerator SATURNE-II *Detector* Calorimeter, SPES-II

Reactions

p deut → ^{3}He η	894 MeV (T_{lab})

Particles studied η, γ

Brief description The first direct measurement of the branching ratio $\Gamma(\eta \to \gamma\gamma)/\Gamma_{tot}$. Expected to achieve an accuracy of 1 to 2%. Uses two BGO photon calorimeters and SPES-II. The target is LD2. Data analysis completed.

Journal papers PR D53 (1996) 11. No other papers expected.

Related experiments SATURNE-198, SATURNE-284

E-mail contact clajus@uclapp.physics.ucla.edu, garcon@phnx7.saclay.cea.fr, lytkin@main1.jinr.dubna.su

SATURNE-278

(Approved Jun 1993, Began data-taking Dec 1995, In progress)

STUDY OF BARYONIC RESONANCES WITH THE NEW DETECTOR AROUND THE SPES-IV TARGET POINT

SPES4-PI COLLABORATION
COPENHAGEN U – R Dahl, C Ellegard, C Gaarde, J Jensen, J S Larsen, M Skousen
DUBNA – Y T Borzunov, L P Golovanov, V P Ladygin, L V Malinina, N M Piskunov, I M Sitnik, E A Strokovsky (√ Spokesperson), A P Tsvinev
ST PETERSBURG, INP – G D Alkhazov, A V Khanzadeyev, V A Mylnikov, A N Prokofiev, V M Samsonov, I V Tkach, V N Vikhrov, A A Vorobyov, A A Zhdanov
JULICH, FORSCHUNGSZENTRUM – H P Morsch
NORFOLK STATE U – V Punjabi
ORSAY – L Bimbot, J L Boyard (√ Spokesperson), L Farhi, J C Jourdain, B Ramstein, M Roy-Stephan
SACLAY – M Boivin, T Hennino, M Kagarlis, R A Kunne (√ Spokesperson), P Radvanyi, E Tomasi-Gustafsson
WARSAW, INST NUCL STUDIES – W Augustyniak, P Zupranski
WILLIAM AND MARY COLL – M Jones, C F Perdrisat

Accelerator SATURNE-II *Detector* SPES4-PI

Reactions

deut p → deut p X	< 3.8 GeV/c
^{3}He nucleus → trit π^+ X	"
^{4}He p → ^{4}He p X	< 7.0 GeV/c
^{12}C nucleus → ^{12}N π^- X	< 3.8 GeV/c

Particles studied N^*(unspec), $N(1440\,P_{11})$

Brief description This is a three-part experiment (278a, 278b, 278c), carried out with a new detector at the target point of SPES-IV. The detector consists of the SPES-IV high resolution spectrometer to detect the scattered beam particles in coincidence with the secondary protons and pions which are registered by two arms of chambers. Studies baryonic resonances. Uses polarized and unpolarized beams, and C, Ca, and Pb, targets. The topics covered by the three parts are (1) coherent pion production from charge exchange reactions, (2) production of the $N^*(1440)$ resonance with alpha particles, and (3) study of spin observables in the production of the $N^*(1440)$ resonance with deuterons. In progress (July 96).

Related experiments SATURNE-250, SATURNE-291, SATURNE-305, JINR-LHE-0941-1B, JINR-LHE-0941-1C

E-mail contact boyard@frcpn11.in2p3.fr, strok@sunhe.jinr.dubna.su, kunne@frcpn11.in2p3.fr

Other SATURNE Experiments

Listed here are some other Saclay experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons.

SATURNE-121 (Completed data-taking 1991)

SEARCH FOR DIBARYONS OF STRANGENESS $S = -1$ BETWEEN THE ΛN AND ΣN THRESHOLDS

Spokespersons: J.P. Didelez, R. Frascaria [Orsay, IPN], B. Preedom [South Carolina U.]

E-mail contact didelez@ipncls.in2p3.fr, frascaria@ipncls.in2p3.fr

SATURNE-144 (Completed data-taking Dec 1990)

NUCLEON–NUCLEON PROGRAM (PART II): np SCATTERING UP TO 1.2 GeV

Spokespersons: F. Lehar, F. Perrot [Saclay], R. Hess [Geneva U.]

E-mail contact lehar@frcpn11.in2p3.fr, hess@sc2a.unige.ch

SATURNE-145 (Completed data-taking 1990)

MEASUREMENTS OF A_{zz} AND P_z FOR THE REACTION $\vec{d}p \to \vec{p}pn$ IN COMPLETE KINEMATICS

Spokespersons: S.L. Belostotsky [St. Petersburg, INP], A. Boudard [Saclay]

E-mail contact boudard@phnx7.saclay.cea.fr

SATURNE-166 (Completed data-taking 1991)

REACTION H$(d, 2p)n$ WITH POLARIZED DEUTERONS AT 200 MeV

Spokesperson: S. Kox [Grenoble U.]

E-mail contact kox@frcpn11.in2p3.fr

SATURNE-174 (Completed data-taking)

PRODUCTION OF LIGHT MESONS X IN $pp \to ppX$ AT THRESHOLD AND IN NUCLEAR MATTER

Spokesperson: O. Bing [Strasbourg, CRN]

E-mail contact obing@frcpn11.in2p3.fr

SATURNE-190 (Completed data-taking May 1991)

SPIN STRUCTURE OF THE Δ EXCITATION

Spokespersons: C. Gaarde [Copenhagen U.], J.L. Boyard [Orsay], P. Zupranski [Soltan Inst., Swierk]

E-mail contact gaarde@nbivax.nbi.dk, zupran@fuw.edu.pl

SATURNE-202 (Completed data-taking 1992)

STUDY OF THE PROTON POLARIZATION IN $\vec{d}$A $\to \vec{p}X$ REACTION AT 0° AND 2.1 GeV

Spokespersons: C.F. Perdrisat [William and Mary Coll.], J. Yonnet [Saclay]

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SATURNE-235 (Completed data-taking 1993)

CALIBRATION OF POLDER, A NEW DEUTERON TENSOR POLARIMETER AT INTERMEDIATE ENERGIES

Spokesperson: Serge Kox [Grenoble U.]

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SATURNE-244 (Completed data-taking Sep 1991)

STUDY OF THE REACTION $\vec{p}p \to \pi^-\pi^-X$

Spokesperson: B. Tatischeff [Orsay, IPN]

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SATURNE-246 (Completed data-taking 1992)

π^0 PRODUCTION IN THE REACTION $dp \to {}^3He\,\pi^0$ NEAR THRESHOLD

Spokespersons: B. Mayer [Saclay], B.M.K. Nefkens [UCLA]

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SATURNE-249 (Completed data-taking 1993)

POLARIZATION TRANSFER IN ELASTIC BACKWARD DEUTERON PROTON SCATTERING

Spokespersons: C.F. Perdrisat [William and Mary Coll.], V. Punjabi [Norfolk State U.], I. Sitnik [Dubna, JINR]

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SATURNE-253 (Completed data-taking 1992)

MEASUREMENTS OF THE POLARIZATION TENSOR AND THE PROBABILITY OF THE SPIN-FLIP IN THE REACTION ^{12}C$(d, d')^{12}$C AT 400 MeV

Spokespersons: S. Kox [Grenoble U.], E. Tomasi-Gustafsson [Saclay], M. Morlet [Orsay, IPN]

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SATURNE-280 (Taking data)

STUDY OF THE REACTION $dd \to \alpha\eta$ CLOSE TO THE THRESHOLD OF η PRODUCTION

Spokespersons: A. Zghiche [Strasbourg, CRN], R. Wurzinger [Saclay], L. Lytkin [Dubna, JINR], Y. Le Bornec, N. Willis [Orsay, IPN]

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SATURNE-290 (Completed data-taking 1994)

MEASUREMENT OF TENSOR OBSERVABLES RELATED TO THE POLARIZATION OF RECOIL DEUTERON IN THE REACTION $pp \to d\pi^+$

Spokespersons: C. Furget, S. Kox [Grenoble U.]

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SATURNE Future Plans

The SATURNE-II accelerator, best known for its polarized proton and deuteron beams, will be closed by the end of 1997. The strong physics program involving large international participation has now been reduced to just two experiments (213 and 278) which are studying the baryonic resonances and a production of coherent pions in the charge exchange reactions. Other experiments and important R&D projects have either been completed or cancelled. There are no plans for direct experimental research at the site beyond 1997, but the Lab will be involved in many intermediate- and high-energy physics projects at other facilities.

Selected Serpukhov Experiments

SERPUKHOV-128

(Proposed 1977, Approved 1984, Began data-taking 1987)

SEARCH FOR NEW SHORT-LIVED PARTICLES IN NEUTRINO INTERACTIONS

SERPUKHOV – V V Ammosov, V I Baranov, A A Ivanilov, P V Ivenov, V M Korablev, V A Korotkov, V V Makeev, A G Myagkov, P V Pitukhin, A Y Polyarush, A A Sokolov
MOSCOW PHYS ENG INST – E Gushchin, A I Lebedev, S V Somov (Spokesperson), G I Tipografshchik
MOSCOW, ITEP – Y A Aleshin, O K Egorov, E D Kolganova, A N Maksimov, I A Melnichenko, E A Pozharova, V I Silaev, V A Smirnitsky, V A Smotryaev, I S Trostin
LEBEDEV INST – S I Kotelnikov, E P Kuznetsov, B I Lomonosov, L I Pervov, V A Ryabov, P S Vasiliev
MOSCOW STATE U – P F Ermolov, V S Murzin, S I Sivoklokov
DUBNA – Y A Batusov, S A Bunyatov, O M Kuznetsov, V V Lyukov, V I Tretyak

Accelerator SERPUKHOV *Detector* Combination

Reactions

ν_μ nucleon $\rightarrow \mu^-$ charm X	3–30 GeV/c
ν_μ nucleon $\rightarrow \Lambda_c^+ \mu^-$ X	"
ν_μ nucleon $\rightarrow \Sigma_c(2455)^+ \mu^-$ X	"
ν_μ nucleon $\rightarrow \Sigma_c(2455)^{++} \mu^-$ X	"
ν_μ nucleon $\rightarrow \mu^-$ charmed-meson X	"
ν_μ nucleon $\rightarrow D_s^\pm \mu^-$ X	"

Particles studied charm

Brief description The detector is a wide angle spectrometer with a streamer chamber and emulsions. 2×10^{18} protons on target were taken.

SERPUKHOV-136

(Proposed 1978, Approved Apr 1978, Began data-taking 1988, In progress)

NEUTRINO DETECTOR

SERPUKHOV – A A Borisov, N I Bozhko, S K Chernichenko, G L Chukin, V N Goryachev, M M Kirsanov, A I Kononov, A S Kozhin, V I Kravtsov, A V Kulikov, A I Mukhin, Y I Salomatin, V A Tumakov, A S Vovenko (√ Spokesperson)
DUBNA – L S Barabash, Y A Batusov, S A Bunjatov (√ Spokesperson), O L Klimov, V V Lyukov, Y A Nefedov, B A Popov, V I Snyatkov, V Y Valuev

Accelerator SERPUKHOV *Detector* Calorimeter

Reactions

p nucleon $\rightarrow$ charm X	70 GeV/c
p nucleon $\rightarrow e^\pm$ X	"
ν_μ nucleon $\rightarrow \mu^-$ X	5–30 GeV/c
ν_μ nucleon $\rightarrow \mu^+ \mu^-$ X	"
ν_μ nucleon $\rightarrow$ charm X	"
$\overline{\nu}_\mu$ nucleon $\rightarrow \mu^+$ X	"
$\overline{\nu}_\mu$ nucleon $\rightarrow \mu^+ \mu^-$ X	"
$\overline{\nu}_\mu$ nucleon $\rightarrow$ charm X	"
ν_e nucleon $\rightarrow e^\pm$ X	"
$\overline{\nu}_e$ nucleon $\rightarrow e^\pm$ X	"
charm $\rightarrow \mu^+$ X	—
charm $\rightarrow e^\pm$ X	—

Particles studied charm

Brief description Searches for $\nu_e \rightarrow \nu_x$ oscillation. Running (April 96).

Journal papers YF 30 (1979) 702 = SJNP 30 (1979) 362, YF 33 (1981) 715 = SJNP 33 (1981) 371, YF 40 (1984) 739 = SJNP 40 (1984) 475, YF 49 (1989) 172, ZPHY C51 (1991) 341, IJMP A7 (1992) 3835, YF 55 (1992) 2092, PL B279 (1992) 405, PL B295 (1992) 154, PL B302 (1993) 336, YF 57 (1994) 2050 = PAN 57 (1994) 1974, PL B369 (1996) 39, and ZPHY C70 (1996) 39.

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SERPUKHOV-145

(Proposed 1981, Approved 1984, Began data-taking 1987, Completed data-taking 1992)

STUDY OF THE PRODUCTION AND DECAY PROPERTIES OF THE CHARMED BARYONS IN NEUTRINO INTERACTIONS WITH THE BUBBLE CHAMBER SKAT

SERPUKHOV – V V Ammosov (√ Spokesperson), E N Ardashev, Y V Bardin, A P Bugorsky, N A Chabrov, V I Ermolaev, V S Fillipov, A A Ivanilov, V I Khleborad, V I Konyushko, V M Korablev, V A Korotkov, V V Makeev, G Y Mitrofanov, A G Myagkov, N A Netyaga, A A Sokolov, I L Vasiliev

Accelerator SERPUKHOV *Detector* HLBC-SKAT

Reactions

$\nu_\mu\ p \rightarrow \Sigma_c(2455)^{++} \mu^-$	5–20 GeV/c
$\nu_\mu\ p \rightarrow \Sigma_c(2530)^{++} \mu^-$	"
$\nu_\mu\ n \rightarrow \Lambda_c^+ \mu^-$	"

Particles studied $\Sigma_c(2455)^{++}$, $\Sigma_c(2530)^{++}$, Λ_c^+

Brief description The chamber fill is a light freon-propane mix. 4×10^{18} protons on target were taken.

Journal papers ZETFP 58 (1993) 241.

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SERPUKHOV-147

(Proposed 1982, Approved Mar 1982, Began data-taking 1984, Completed data-taking 1991)

STUDY OF REACTIONS WITH STRANGE PARTICLE PRODUCTION IN THE π^- AND K^- MESON BEAM OF THE IHEP ACCELERATOR

MOSCOW, ITEP – B P Barkov, B V Bolonkin, I A Erofeev, O N Erofeeva, V K Grigoriev, A P Grishin, Y V Katinov, I Y Korolkov, V N Luzin, V V Miller, V N Nozdrachev, Y P Shkurenko, V V Sokolovsky (√ Spokesperson), A I Sutormin, G D Tikhomirov, V V Vladimirsky

Accelerator SERPUKHOV *Detector* MIS

Reactions

$\pi^- p \rightarrow n \Lambda \overline{\Lambda}$	40 GeV/c
$\pi^- p \rightarrow n \Lambda \overline{\Lambda} \pi^0$	"
$\pi^- p \rightarrow p \Lambda \overline{\Lambda} \pi^-$	"
$\pi^- p \rightarrow n\, 2K_S$	"
$\pi^- p \rightarrow n\, K_S\, K_L$	"
$\pi^- p \rightarrow n\, 2K_S\, \pi^0$	"
$\pi^- p \rightarrow n\, K_S\, K_L\, \pi^0$	"
$\pi^- p \rightarrow p\, 2K_S\, \pi^-$	"
$\pi^- p \rightarrow p\, K_S\, K_L\, \pi^-$	"
$\pi^- p \rightarrow n\, \Sigma^0\, \overline{\Sigma}^0$	"
$\pi^- p \rightarrow$ glueball X	"
$\pi^- p \rightarrow f_2(1720)$ X	"
$\pi^- p \rightarrow$ X $C(1480)^-$	"
$K^- p \rightarrow \Lambda \overline{\Lambda} Y^*$(unspec)	"
$K^- p \rightarrow K_S\, K_L\, Y^*$(unspec)	"
glueball $\rightarrow 2K_S$	—
$f_2(1720) \rightarrow 2K_S$	—
$C(1480)^- \rightarrow K_S\, K_L\, \pi^-$	—

Particles studied $f_0(975)$, $a_0(980)^0$, $f_2(1720)$, glueball, $C(1480)^-$, Y^*(unspec), $f_2'(1525)$

Brief description Requested 2400-3000 hours.

Journal papers YF 43 (1986) 1211, YF 43 (1986) 1487 = SJNP 43 (1986) 959, YF 46 (1987) 799, NP B309 (1988) 426, and YF 48 (1988) 1213 = SJNP 48 (1988) 770.

Related experiments SERPUKHOV-173

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SERPUKHOV-152

(Proposed 1983, Approved Aug 1984, In preparation)

NEUTRINO EXPERIMENT USING A TAGGED NEUTRINO BEAM

SERPUKHOV – V V Ammosov, V B Anykeyev, A A Bel'kov, S V Belikov, A P Bugorsky, A Chesnokov, A G Denisov, S P Denisov (√ Spokesperson), A Y Dushkin, N N Fedyakin, A N Galyaev, N A Galyaev, S S Gershtein, Y V Gilitsky, S N Gurzhiev, V I Kochetkov, V I Kotov, A V Kozelov, V P Kryuchkov, V I Kurbakov, A A Lebedev, V N Lebedev, V V Lipajev, A Y Maslov, S A Medved, V N Mikhailin, Y V Mikhailov, V A Onuchin, Y M Pishchalnikov, A V Schukin, I V Shein, A P Soldatov, A A Spiridonov, A P Starkov, D A Stoyanova, A V Uzunyan
INFN, PISA – C Cerri, G Gennaro, F Sergiampietri, G Spandre
INFN, FLORENCE – G Conforto, A Marchionni
BERLIN-ZEUTHEN ADW – J Baehr, G Bohm, R Nahnhauer, S Nowak, A Schwind
DUBNA – J Cvach, V K Dodokhov, N G Fadeev, V Genchev, I A Golutvin, J Hladky, V G Kadykov, V Y Karzhavin, V S Khabarov, Y T Kiryushin, V G Krivokhizhin, V V Kukhtin, V N Lysyakov, P K Markov, S Nemecek, A A Popov, D Pose, A Prokes, P Reimer, S Riman, I A Savin, G I Smirnov, D A Smolin, J Strachota, G Sultanov, L V Svetov, V A Sviridov, P Todorov, M Vinde, J Zacek, N I Zamyatin

Accelerator SERPUKHOV *Detector* Combination

Reactions

$\nu_e\ e^- \to e^-\ \nu_e$	< 70 GeV (E_{lab})
$\nu_\mu\ e^- \to e^-\ \nu_\mu$	"
ν_e nucleon $\to e^-$ X	"
ν_e nucleon $\to \nu_e$ X	"
ν_e nucleon $\to \tau^-$ X	"
ν_e nucleon $\to e^-\ \mu^+$ X	"
ν_μ nucleon $\to \mu^-$ X	"
ν_μ nucleon $\to \nu_\mu$ X	"
ν_μ nucleon $\to \mu^+\ \mu^-$ X	"
charmed-meson $\to \mu^+$ X	—

Particles studied ν_e, ν_μ, τ^-, charmed-meson

Brief description Some of the physics goals are a study of the ν_e-ν_μ universality and $\nu_e \to \nu_\mu \to \nu_\tau$ oscillations, and a measurement of the charged to neutral currents ratio.

Journal papers YF 52 (1990) 1040.

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SERPUKHOV-157

(Proposed 1983, Approved Mar 1983, Began data-taking 1986, In progress)

NEW RADIAL-EXITED RESONANCES SEARCH IN DIFFRACTIVE PROCESSES ON NUCLEI WITH DETECTOR MIS-2

DUBNA – M A Ananjeva, V V Antipov, Y I Ivanshin, I G Kosarev, V A Moiseenko, V A Petrov, Y P Petukhov, S Y Sychkov, A A Tyapkin (√ Spokesperson), I M Vasilevsky, V V Vishnyakov, O A Zaymidoroga
MILAN U – P L Frabetti, P F Manfredi, F Palombo

Accelerator SERPUKHOV *Detector* MIS-2

Reactions

π^- Si $\to$ 3pion Si	40 GeV/c
π^- Be $\to$ 3pion Be	40 GeV/c

Particles studied meson

Brief description Uses the modified spectrometer MIS with additional spark chambers. Searches for new radial excitations of π, $a_1(1260)$, $a_2(1320)$, and $\pi_2(1670)$ mesons. Requested running time is 720 hours.

Journal papers YF 43 (1986) 917 = SJNP 43 (1986) 585, and NC A107 (1994) 2855.

Related experiments FNAL-706, SERPUKHOV-164

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SERPUKHOV-159

(Proposed 1983, Approved May 1986, Began data-taking 1992, In progress)

INVESTIGATION OF CHARMED PARTICLES AND SEARCH FOR MULTIQUARK STATES USING EXCHARM SPECTROMETER AT THE SERPUKHOV ACCELERATOR

DUBNA – A N Aleev, V P Balandin, I I Evsikov, P Z Hristov, I M Ivanchenko, Z M Ivanchenko, M N Kapishin, N N Karpenko, V D Kekelidze (√ Spokesperson), I G Kosarev, Z I Kozhenkova, Y A Kozhevnikov, Y A Kretov, N A Kuz'min, A L Lyubimov, D T Madigojin, A S Mestvirishvili, P V Moisenz, A N Morozov, V V Pal'chik, Y K Potrebenikov, T G Progulova, V A Sashin, V E Simonov, A G Skripnichuk, V N Spaskov, G T Tatishvili, A L Tkachev, I P Yudin, O I Yuldashev, M B Yuldasheva, A I Zinchenko
ALMA ATA, PHYS INST – A A Loktionov
KAZAKH STATE U – G K Potrebenikov
LEBEDEV INST – S P Baranov, M V Belov, V A Kozlov, S Y Potashev
MINSK, INST NUCL PROBLEMS – A S Kurilin
BUCHAREST, INST PHYS – A Bragadireanu, L Groza, M Iliesku, T Ponta
SERPUKHOV – A P Bugorski
SOFIYA, INST CHEM TECH – V Zayachki
SOFIYA, INST NUCL RES – I M Geshkov, S Piperov
TBILISI STATE U – L N Abesalashvili, N S Amaglobeli, B G Chiladze, M V Kopadze, R A Kvatadze, N L Lomidze, G I Nikobadze, T G Pitskhelauri
TBILISI, INST PHYS – T S Grigalashvili

Accelerator SERPUKHOV *Detector* EXCHARM

Reactions

n nucleus $\to X(3100)$ X	< 70 GeV (E_{lab})
n nucleus $\to X(3250)$ X	"
n nucleus $\to N\phi(1950)$ X	"
n nucleus $\to \bar{D}^0$ X	"
n nucleus $\to \Sigma_c(2455)^{++}$ X	"
n nucleus $\to \Sigma_c(2455)^0$ X	"
n nucleus $\to \Lambda_c^+$ X	"
n nucleus $\to \Xi_c^+$ X	"
n nucleus $\to \Xi_c^0$ X	"
n nucleus $\to \phi$ X	"

Particles studied $X(3100)$, $X(3250)$, $N\phi(1950)$, $\bar{D}^0$, Λ_c^+, $\Sigma_c(2455)^{++}$, $\Sigma_c(2455)^0$, Ξ_c^+, Ξ_c^0, ϕ

Brief description Uses the EXCHARM detector.

Journal papers PTE 4 (1995) 8, JINR PAPID COM 3(77) (1996) 5.

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SERPUKHOV-164

(Proposed 1980, Approved May 1986, Began data-taking 1988, Completed data-taking Mar 1996)

INVESTIGATIONS OF THE $\pi^- p \to n\pi^+\pi^-\pi^+\pi^-(\gamma$'s) REACTION AT 40 GeV/$c$ USING THE VERTEX SPECTROMETER

SUMMARIES OF SERPUKHOV EXPERIMENTS

SERPUKHOV – D V Amelin, E B Berdnikov, S I Bityukov, G V Borisov, V A Dorofeev, R I Dzhelyadin, Y P Gouz, Y M Ivanyushenkov, I A Kachaev, A N Karyukhin, Y A Khokhlov, G A Klyuchnikov, V F Konstantinov, S V Kopikov, M E Kostrikov, V V Kostyukhin, A A Kriushin, M A Kulagin, S A Likhoded, V D Matveev, A P Ostankov, D I Ryabchikov, O V Solovianov, E A Starchenko, N K Vishnevsky, E A Vlasov, A M Zaitsev (√ Spokesperson)
TBILISI, INST PHYS – T A Lomtadze, G G Sekhniaidze, E G Tskhadadze

Accelerator SERPUKHOV *Detector* VES

Reactions

$\pi^- p \to n\, 2\pi^+\, 2\pi^-$ (γ's)	37 GeV/c
$\pi^- p \to n\, 2\pi^+\, 2\pi^-$	"
$\pi^- p \to n\, 2\rho^0$	"
$\pi^- p \to n\, 2\eta'$	"
$\pi^- p \to n\, f_1(1285)$	"
$\pi^- p \to n\, \eta'\, \eta$	"
$\pi^- p \to n\, \omega\, \eta$	"
$\pi^- p \to n$ meson (mesons)	"
$\pi^- p \to p$ meson (mesons)	"
$\pi^- p \to n\, \pi^+\, \pi^-\, \eta$	"
$\pi^- p \to p\, \pi^-\, \eta\, \eta$	"
$\pi^- p \to n\, \omega\, \omega$	"
$\pi^- p \to p\, K^+\, K^-\, \pi^-$	"
$K^- p \to p\, K^-\, \pi^+\, \pi^-$	"
$K^- p \to p\, K^-\, \pi^+\, \pi^-\, \pi^0$	"

Particles studied ρ^0, η, η', ω, $f_1(1285)$, $\pi(1770)$, exotic, glueball, meson

Brief description Uses VES (VErtex Spectrometer) – a wide aperture magnetic spectrometer combined with a lead glass gamma detector and Čerenkov identifiers. In addition to the reactions listed above, also studies decays of the mesons produced in the reactions.

Journal papers PL B268 (1991) 137, ZPHY C54 (1992) 235, ZPHY C54 (1992) 367, YF 55 (1992) 2460, ZPHY C57 (1992) 13, PL B313 (1993) 276, PL B337 (1994) 219, ZPHY C66 (1995) 71, PL B356 (1995) 595, ZPHY C80 (1996) 71, and YF 59 (1996) 1021.

Related experiments BNL-852, SERPUKHOV-163

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WWW Home-page http://dxbec.ihep.su/

SERPUKHOV-166

(Proposed 1987, Approved 1987, Began data-taking 1987)

STUDY OF RARE DECAYS WITH THE ISTRA-M DETECTOR

MOSCOW, INR – V N Bolotov (Spokesperson), E N Gushchin, V V Isakov, O V Karavichev, V A Lebedev, V N Marin, Y V Musienko, A A Poblaguev, V E Postoev, G N Semenuk, S A Volkov
SERPUKHOV – V F Konstantinov
DUBNA – G Kalmar, A Z Kitikyan, E V Komissarov, V S Kurbatov, V Z Serdyuk, V V Sidorov, A D Volkov, B Z Zalikhanov

Accelerator SERPUKHOV *Detector* ISTRA-M

Reactions

$K^- \to \pi^-\, \nu_e\, \overline{\nu}_e$	25 GeV/c
$K^- \to \pi^-\, \nu_\mu\, \overline{\nu}_\mu$	"
$K^- \to e^-\, \overline{\nu}_e\, \gamma$	"
$K^- \to \pi^-\, e^-\, e^+$	"
$K^- \to \pi^-\, \mu^-\, \mu^+$	"

Particles studied π^-, K^-

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SERPUKHOV-167

(Proposed 1975, Approved 1987, Began data-taking 1987, In progress)

STUDY OF RARE KAON DECAYS

SERPUKHOV – A M Blick, V N Kolosov, V M Kutjin, V N Shelikhov
DUBNA – V Y Batusov, Y A Budagov, I E Chirikov-Zorin, Y I Davydov, V B Flyagin (√ Spokesperson), V V Glagolev, A V Kolomyichenko, Y F Lomakin, S N Malyukov, O E Pukhov, V I Romanovsky, N A Rusakovich, N L Rusakovich, A A Semenov, A N Shaljugin, A S Soloviev, V B Vinogradov, A G Volodko
TBILISI STATE U – G A Chlachidze, I A Minashvili
SOFIYA U – A B Jordanov, L Litov, G V Velev
MINSK, INST PHYS – Y A Kulchitsky, A S Kurilin

Accelerator SERPUKHOV *Detector* HYPERON-II

Reactions

$K^+ \to \pi^+\, 2\pi^0$	10 GeV/c
$K^+ \to \pi^+\, \pi^0\, \gamma$	"
$K^+ \to \pi^+\, 2\gamma$	"
$K^+ \to \pi^0\, e^+\, \nu_e$	"
$K^+ \to 2\pi^0\, e^+\, \nu_e$	"
$K^+ \to \pi^0\, e^+\, \nu_e\, \gamma$	"
$K_S \to e^-\, e^+$	"
$K_S \to 2\gamma$	"
$K_S \to e^-\, e^+\, \gamma$	"
$K_S \to \pi^0\, e^-\, e^+$	"

Particles studied K^+, K_S

Brief description The setup consists of a pair of one-arm spectrometers: one to measure the beam momentum, and the second, a large aperture spectrometer, to register the secondary charged particles momenta. All coordinates in the spectrometers are measured by proportional chambers (about 10,000 channels). Two large lead glass multichannel (850 channels) hodoscopic spectrometers are used to detect γ energies. Taking data (July 96).

Journal papers PL B259 (1991) 225, PL B334 (1994) 234, and PTE 3 (1994) 13.

Related experiments SERPUKHOV-166, BNL-791, BNL-845

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SERPUKHOV-169

(Proposed 1977, Approved Jul 1977, Began data-taking 1985, Completed data-taking 1993)

INVESTIGATIONS OF HADRONIC SPECTROSCOPY WITH THE DETECTOR SPHINX

SERPUKHOV – S V Golovkin, A P Kozhevnikov, V P Kubarovsky, A I Kulyavtsev, V F Kurshetsov, A E Kushnerenko, L G Landsberg (√ Spokesperson), V V Molchanov, V A Mukhin, I N Nikitin, A V Skleznev, V I Solyanik, D V Vavilov, V A Viktorov
MOSCOW, ITEP – M Y Balatz, G B Dzyubenko, G K Kliger, V Z Kolganov, V S Lakaev, G S Lomkatzi, A F Nilov, V T Smolyankin, V E Vishnyakov

Accelerator SERPUKHOV *Detector* SPHINX

Reactions

p nucleon $\to$ DD $< p\, K^+\, K^- >$ nucleon	70 GeV (E_{lab})
p nucleon $\to$ DD $< p\, \phi >$ nucleon	"
p nucleon $\to$ DD $< \Lambda\, K^+ >$ nucleon	"
p nucleon $\to$ DD $< \Lambda(1405\, S_{01})\, K^+ >$ nucleon	"
p nucleon $\to$ DD $< \Lambda(1520\, D_{03})\, K^+ >$ nucleon	"
p nucleon $\to$ DD $< \Sigma^0\, K^+ >$ nucleon	"

p nucleon → DD < $\Sigma(1385\,P_{13})^0$ K^+ > nucleon	70 GeV (E_{lab})
p nucleon → DD < $p\,\pi^+\,\pi^-$ (γ's) > nucleon	"
p nucleon → DD < $p\,\omega$ > nucleon	"
p nucleon → DD < $p\,\eta$ > nucleon	"
p nucleon → DD < $p\,\eta'$ > nucleon	"
p nucleon → DD < $p\,p\,\overline{p}$ > nucleon	"
p nucleon → (neutrals) X	"
p nucleus → DD < $p\,K^+\,K^-$ > nucleus	"
p nucleus → DD < $p\,\phi$ > nucleus	"
p nucleus → DD < $\Lambda\,K^+$ > nucleus	"
p nucleus → DD < $\Lambda(1405\,S_{01})\,K^+$ > nucleus	"
p nucleus → DD < $\Lambda(1520\,D_{03})$ K^+ > nucleus	"
p nucleus → DD < $\Sigma^0\,K^+$ > nucleus	"
p nucleus → DD < $\Sigma(1385\,P_{13})^0$ K^+ > nucleus	"
p nucleus → DD < $p\,\pi^+\,\pi^-$ (γ's) > nucleus	"
p nucleus → DD < $p\,\omega$ > nucleus	"
p nucleus → DD < $p\,\eta$ > nucleus	"
p nucleus → DD < $p\,p\,\overline{p}$ > nucleus	"
$\phi \rightarrow K^+\,K^-$	—
$\Lambda \rightarrow p\,\pi^-$	—
$\Lambda(1405\,S_{01}) \rightarrow \Sigma^+\,\pi^-$	—
$\Lambda(1405\,S_{01}) \rightarrow \Sigma^0\,\pi^0$	—
$\Sigma^+ \rightarrow p\,\pi^0$	—
$\Lambda(1520\,D_{03}) \rightarrow p\,K^-$	—
$\Sigma^0 \rightarrow \Lambda\,\gamma$	—
$\Sigma(1385\,P_{13}) \rightarrow \Lambda\,\pi^0$	—
$\omega \rightarrow \pi^+\,\pi^-\,\pi^0$	—
$\eta \rightarrow \pi^+\,\pi^-\,\pi^0$	—
$\eta' \rightarrow \pi^+\,\pi^-\,\eta$	—

Particles studied baryon, $N\phi(1950)$, $\Sigma(3170\,B)^+$

Brief description Studies baryon diffractive production, coherent reactions on nuclei, and searches for exotic baryons including pentaquark cryptoexotic baryon resonances with hidden strangeness in the mass region up to 4.5 GeV/c^2. Uses Be and C as nuclear targets. SPHINX consists of a wide aperture magnetic spectrometer with proportional and drift chambers working in combination with a multichannel gamma spectrometer and a system of Čerenkov detectors for the identification of charged secondary particles. Data analysis completed.

Journal papers YF 52 (1990) 494, YF 57 (1994) 47, YF 57 (1994) 241, YF 57 (1994) 253, ZPHY C61 (1994) 223, ZPHY C61 (1994) 399, NC A107 (1994) 2441, YF 57 (1994) 1376, YF 57 (1994) 2030, YF 57 (1994) 2042, UFN 164 (1994) 1129, YF 58 (1995) 1426, and ZPHY C68 (1995) 585.

Related experiments SERPUKHOV-120, SERPUKHOV-178

E-mail contact lgl@mx.ihep.su

SERPUKHOV-172

(Proposed 1988, Approved May 1988, Began data-taking Dec 1991, In progress)

STUDY OF MESONS WITH AN ENHANCED GLUON COMPONENT (GLUEBALLS INCLUDED) AND MESONS WITH HIGH SPINS USING THE MULTIPHOTON 4π SPECTROMETER

SERPUKHOV – A V Dolgopolov, S V Donskov, A V Inyakin, G V Khaustov, A A Kondashov, A K Konoplyannikov, A V Kulik, A A Lednev, V A Lishin, Y M Melnik, S A Polovnikov, V A Polyakov, Y D Prokoshkin (√ Spokesperson), S A Sadovsky, V D Samoylenko, P M Shagin, A V Shtannikov, A V Singovsky, E A Sobol, V P Sugonyaev
TBILISI, INST PHYS – A K Djavrishvili, T A Lomtadze, G G Sekhniaidze, E G Tskhadadze
LOS ALAMOS – D Alde, E A Knapp, T Lopez
BRUSSELS U, IISN – F Binon, J P Stroot
ANNECY – J P Peigneux, M Poulet
KEK – S Inaba, M Kobayashi, T Tsuru
MIYAZAKI U – T Nakamura, K Takamatsu

Accelerator SERPUKHOV *Detector* GAMS-4PI

Reactions

$\pi^-\,p \rightarrow n\,2\pi^0$	32 GeV/c
$\pi^-\,p \rightarrow n\,2\eta$	"
$\pi^-\,p \rightarrow n\,\eta'\,\eta$	"
$\pi^-\,p \rightarrow n\,\eta\,\pi^0$	"
$\pi^-\,p \rightarrow n\,\eta\,2\pi^0$	"
$\pi^-\,p \rightarrow n\,2\omega$	"
$\pi^-\,p \rightarrow n\,K^0\,\overline{K}^0$	"
$\pi^-\,p \rightarrow n\,2\text{meson}^0$	"
$\pi^-\,p \rightarrow \text{meson}^0$ X	"
$\pi^-\,p \rightarrow$ glueball X	"
$\pi^-\,p \rightarrow J/\psi(1S)$ X	"
$\pi^-\,p \rightarrow \psi(2S)$ X	"
$\pi^-\,p \rightarrow \eta_c(1S)$ X	"
$\pi^-\,p \rightarrow \chi_c$(unspec) X	"
$K^-\,p \rightarrow \text{meson}^0$ X	"
glueball → $4\pi^0$	—
glueball → 2η	—
glueball → $\eta'\,\eta$	—
glueball → $2\eta'$	—
$\text{meson}^0 \rightarrow 2\pi^0$	—
$\text{meson}^0 \rightarrow 2\eta$	—
$\text{meson}^0 \rightarrow \eta'\,\pi^0$	—
$\eta_c(1S) \rightarrow \eta\,2\pi^0$	—
$\pi^0 \rightarrow 2\gamma$	—
$\eta \rightarrow 2\gamma$	—

Particles studied glueball, meson^0

Brief description Data taking and data analysis are in progress (May 96).

Journal papers NIM A268 (1988) 112, NIM A276 (1989) 652, PTE 1 (1990) 68, PTE 2 (1990) 90, PTE 5 (1991) 55, and NIM A302 (1991) 443.

Related experiments BNL-852

E-mail contact prokoshkin@mx.ihep.su

SERPUKHOV-173

(Proposed 1991, Approved 1992, Began data-taking 1992, In progress)

STUDY OF STRANGE PARTICLE RESONANT STATES USING HADRON BEAMS WITH MOMENTA OF 40-70 GeV/c AT THE IHEP ACCELERATOR

MOSCOW, ITEP – B P Barkov, I A Erofeev, O N Erofeeva, V K Grigoriev, A P Grishin, Y V Katinov, I Y Korolkov, V I Lisin, V N Luzin, V N Nozdrachev (√ Spokesperson), Y P Shkurenko, V V Sokolovsky, G D Tikhomirov, V V Vladimirsky

Accelerator SERPUKHOV *Detector* MIS

Reactions

$\pi^-\,p \rightarrow n\,2K_S$	40 GeV/c
$\pi^-\,p \rightarrow n\,2K_S\,\pi^0$	"
$\pi^-\,p \rightarrow n\,K_S\,K_L\,\pi^+\,\pi^-$	"
$\pi^-\,p \rightarrow n\,K_S\,K_L\,\pi^0$	"
$\pi^-\,p \rightarrow K_S\,\pi^+\,\pi^-\,Y^*$(unspec)	"
$\pi^-\,p \rightarrow p\,K_S\,K_L\,\pi^-$	"
$\pi^-\,p \rightarrow n\,\Lambda\,\overline{\Lambda}$	"

$K^- p \to 2K_S\ Y^*$(unspec)	"
$K^- p \to n\ K_S\ \pi^+\ \pi^-$	"
$K^- p \to \Lambda\ \overline{\Lambda}\ Y^*$(unspec)	"

Particles studied $C(1480)^-$, $C(1480)^0$, $\rho(1700)^0$, $X(3100)$, $\phi(1680)$, $\phi_3(1850)$, $f_2(1720)$, $f_2(1810)$, $f_2(2010)$, $f_4(2050)$, $f_4(2220)$, $K_2^*(1430)^-$

Brief description Extends an earlier K_SK_S and $\Lambda\overline{\Lambda}$ final states study (SERPUKHOV-147) to the range of masses between 1.8 and 2.5 GeV. Investigates the K_SK_L system using π^- and K^- beams with the momentum of 40 GeV/c. Studies baryon-antibaryon and $\phi\phi$ states. Searches for $C(1480)$ mesons by detecting K^0K^* pairs. Uses two charged-particle triggers. Requested 2100 hours.

Journal papers PTE 3 (1994) 43, YF 58 (1995) 50 = PAN 58 (1995) 46, and YF 58 (1995) 1628.

Related experiments SERPUKHOV-147

E-mail contact nozdrachev@mx.ihep.su, nozdrachev@vxitep.itep.ru

SERPUKHOV-177

(Proposed 1990, Approved Jul 1993, In preparation)

MEASUREMENT OF THE MASS OF THE Σ^- HYPERON

ST PETERSBURG, INP – A S Denisov, O L Fedin, M P Guriyev, Y M Ivanov (√ Spokesperson), L P Lapina, P M Levchenko, A A Petrunin, Y P Platonov, V M Suvorov, A V Zhelamkov

Accelerator SERPUKHOV *Detector* QUARTZ

Reactions

p C $\to \Sigma^-$ X	70 GeV/c
p Mg $\to \Sigma^-$ X	"
p Cu $\to \Sigma^-$ X	"
p Pb $\to \Sigma^-$ X	"

Particles studied Σ^-

Brief description Approved for 360 hours. QUARTZ is a crystal diffraction spectrometer for hadronic X-rays with a semiconductor detector. Waiting for the run time (July 96).

E-mail contact yumi@hep486.pnpi.spb.ru

SERPUKHOV-178

(Proposed 1994, Approved 1994, In preparation)

SEARCH FOR EXOTIC BARYON STATES WITH THE MODIFIED DETECTOR SPHINX

SERPUKHOV – S A Akimenko, Y M Antipov, V A Batarin, V A Bezzubov, A A Derevshchikov, S V Erin, O V Eroshin, S V Golovkin, Y P Gorin, V N Govorun, A N Isaev, V A Kachanov, Y D Karpekov, A S Konstantinov, A P Kozhevnikov, V P Kubarovsky, V F Kurshetsov, L G Landsberg (√ Spokesperson), M Y Matveev, V A Medovikov, V V Molchanov, V A Mukhin, I N Nikitin, O V Orel, A I Pavlinov, S V Petrenko, V S Petrov, A I Petrukhin, P A Semenov, V A Senko, M M Soldatov, V L Solovianov, V I Solyanik, A N Sytin, V S Vaniev, D V Vavilov, V A Viktorov, S A Zimin
MOSCOW, ITEP – G K Kliger, V Z Kolganov, G S Lomkatzi, A F Nilov, V T Smolyankin

Accelerator SERPUKHOV *Detector* SPHINX

Reactions

p nucleon $\to$ DD $< p\ K^+\ K^- >$ nucleon	70 GeV (E_{lab})
p nucleon $\to$ DD $< p\ \phi >$ nucleon	"
p nucleon $\to$ DD $< \Lambda\ K^+ >$ nucleon	"
p nucleon $\to$ DD $< \Lambda(1405\ S_{01})\ K^+ >$ nucleon	"
p nucleon $\to$ DD $< \Lambda(1520\ D_{03})\ K^+ >$ nucleon	"
p nucleon $\to$ DD $< \Sigma^0\ K^+ >$ nucleon	70 GeV (E_{lab})
p nucleon $\to$ DD $< \Sigma(1385\ P_{13})^0\ K^+ >$ nucleon	"
p nucleon $\to$ DD $< p\ \pi^+\ \pi^-$ (γ's) > nucleon	"
p nucleon $\to$ DD $< p\ \omega >$ nucleon	"
p nucleon $\to$ DD $< p\ \eta >$ nucleon	"
p nucleon $\to$ DD $< p\ \eta' >$ nucleon	"
p nucleon $\to$ DD $< p\ p\ \overline{p} >$ nucleon	"
p nucleus $\to$ DD $< p\ K^+\ K^- >$ nucleus	"
p nucleus $\to$ DD $< p\ \phi >$ nucleus	"
p nucleus $\to$ DD $< \Lambda\ K^+ >$ nucleus	"
p nucleus $\to$ DD $< \Lambda(1405\ S_{01})\ K^+ >$ nucleus	"
p nucleus $\to$ DD $< \Lambda(1520\ D_{03})\ K^+ >$ nucleus	"
p nucleus $\to$ DD $< \Sigma^0\ K^+ >$ nucleus	"
p nucleus $\to$ DD $< \Sigma(1385\ P_{13})^0\ K^+ >$ nucleus	"
p nucleus $\to$ DD $< p\ \pi^+\ \pi^-$ (γ's) > nucleus	"
p nucleus $\to$ DD $< p\ \omega >$ nucleus	"
p nucleus $\to$ DD $< p\ \eta >$ nucleus	"
p nucleus $\to$ DD $< p\ p\ \overline{p} >$ nucleus	"
$\phi \to K^+\ K^-$	—
$\Lambda \to p\ \pi^-$	—
$\Lambda(1405\ S_{01}) \to \Sigma^+\ \pi^-$	—
$\Lambda(1405\ S_{01}) \to \Sigma^0\ \pi^0$	—
$\Sigma^+ \to p\ \pi^0$	—
$\Lambda(1520\ D_{03}) \to p\ K^-$	—
$\Sigma^0 \to \Lambda\ \gamma$	—
$\Sigma(1385\ P_{13}) \to \Lambda\ \pi^0$	—
$\omega \to \pi^+\ \pi^-\ \pi^0$	—
$\eta \to \pi^+\ \pi^-\ \pi^0$	—
$\eta' \to \pi^+\ \pi^-\ \eta$	—

Particles studied baryon, $N\phi(1950)$, $\Sigma(3170\ B)^+$

Brief description Studies the baryon diffractive production, coherent reactions on nuclei, and searches for exotic baryons including pentaquark cryptoexotic baryon resonances with hidden strangeness in the mass region up to 4.5 GeV/c^2. Uses C and nuclear targets. SPHINX consists of a wide aperture magnetic spectrometer with proportional chambers and drift tubes working in combination with a multichannel gamma spectrometer and a system of Čerenkov detectors (including RICH counters) for the identification of charged secondary particles.

Related experiments SERPUKHOV-169

E-mail contact lgl@mx.ihep.su

SERPUKHOV-UNK-001

(Proposed 1988, Approved Apr 1988, In preparation)

STUDY OF SPIN EFFECTS AT 100 TO 600 GeV USING AN INTERNAL JET TARGET AT UNK

SERPUKHOV – G A Alekseev, Y I Arestov, N I Belikov, V V Borog, B V Chujko, V S Datsko, A M Davidenko, A A Derevshchikov, A M Gorin, O A Grachev, V N Grishin, V A Kachanov, Y V Kharlov, V Y Khodyrev, V G Lapshin, V M Leontiev, I V Manujlov, Y A Matulenko, V A Medvedev, Y M Melnik, A P Meschanin, N G Minaev, V V Mochalov, A I Mysnik, S B Nurushev, D I Patalakha, A M Pavlinov, V A Polyakov, A F Prudkoglyad, V I Rykalin, V V Rykalin, V L Rykov, V L Solovianov (√ Spokesperson), L F Soloviev, S M Troshin, O D Tsai, M N Ukhanov, A N Vasiliev, A E Yakutin, S V Yerin
DUBNA – L S Barabash, S I Bilenkaya, N S Borisov, V A Budilov, V V Fimushkin, M Finger, N V Gorbunov,

N L Gorshkova, V A Kalinnikov, A G Karev, B A Khachaturov, V S Kiselev, B Z Kopeliovich, M I Kulikov, R H Kutuev, E A Ladygin, A B Levkovich, M Y Liburg, V N Matafonov, A B Neganov, V A Nikitin, P V Nomokonov, V P Obudkovsky, Y K Pilipenko, I L Pisarev, Y A Pliss, A A Popov, I K Potashnikova, M G Shafranova, V V Shutov, V I Snyatkov, Y A Usov, A I Valevich, V P Yershov, I V Zhigulin, N K Zhydkov, R Y Zulkarneev
TBILISI STATE U – N S Amaglobeli, Y S Bagaturia, B G Chiladze, G A Dzhambazishvili, L N Glonty, G G Macharashvili, A I Ocherashvili, R M Sakandelidze, T M Sakhelashvili
MOSCOW STATE U – L I Belzer, A I Demianov, A M Gribushkin, N A Kruglov, A S Proskuryakov, L I Sarycheva, N B Sinev, A A Yershov
MICHIGAN U – L V Alexeeva, V A Anferov, B B Blinov, J A Bywater, C M Chu, D G Crabb, D B Crandell, Y S Derbenev, S E Gladycheva, S-Q Hu, S V Koutin, A D Krisch (√ Spokesperson), A M T Lin, T J Liu, V G Luppov, D C Peaslee, R A Phelps, L G Ratner, R S Raymond, M A Skalsey, J A Stewart, S M Varzar, V K Wong
MIT – G R Court, D Kleppner

Accelerator SERPUKHOV-UNK *Detector* NEPTUN

Reactions Polarized target

$p\ p \to p\ p$	100–600 GeV/c
$p\ p \to \gamma$ X	"
$p\ p \to e^-\ e^+$ X	"
$p\ p \to \mu^-\ \mu^+$ X	"
$p\ p \to$ pion X	"
$p\ p \to K^{\pm}$ X	"
$p\ p \to \eta$ X	"
$p\ p \to \eta'$ X	"
$p\ p \to \omega$ X	"
$p\ p \to f_2(1270)$ X	"
$p\ p \to$ jet X	"
$p\ p \to \gamma$ jet X	"
$p\ p \to \Lambda$ X	"
$p\ p \to \overline{\Lambda}$ X	"
$p\ p \to p$ X	"
$p\ p \to \overline{p}$ X	"
$p\ p \to$ hyperon X	"
$p\ p \to \Sigma^+$ X	"
$p\ p \to \Sigma^-$ X	"
$p\ p \to \Xi^-$ X	"
$p\ p \to \Lambda_c^+$ X	"
p nucleus $\to \gamma$ X	"
p nucleus $\to e^-\ e^+$ X	"
p nucleus $\to \mu^-\ \mu^+$ X	"
p nucleus $\to$ pion X	"
p nucleus $\to K^{\pm}$ X	"
p nucleus $\to \eta$ X	"
p nucleus $\to \eta'$ X	"
p nucleus $\to \omega$ X	"
p nucleus $\to f_2(1270)$ X	"
p nucleus $\to$ jet X	"
p nucleus $\to \gamma$ jet X	"
p nucleus $\to \Lambda$ X	"
p nucleus $\to \overline{\Lambda}$ X	"
p nucleus $\to p$ X	"
p nucleus $\to \overline{p}$ X	"
p nucleus $\to$ hyperon X	"
p nucleus $\to \Sigma^+$ X	"
p nucleus $\to \Xi^-$ X	"
p nucleus $\to \Lambda_c^+$ X	"

Brief description Studies spin effects when the 600 GeV protons in the UNK rings collide with a spin-polarized ultra-cold atomic hydrogen internal jet target. Five different spectrometers will observe spin phenomena in various hadron–hadron reactions at small, medium, and large transverse momenta.

Journal papers PTE 3 (1991) 52, and PTE 4 (1991) 57.

Related experiments BNL-794

E-mail contact solovianov@mx.ihep.su, krisch@miphys.physics.lsa.umich.edu

Other Serpukhov Experiments

Listed here are some other Serpukhov experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons.

SERPUKHOV-149 (Completed data-taking 1996)

STUDY OF ASYMMETRY IN INCLUSIVE REACTIONS $\pi^- \vec{p} \to \pi^0 X$ AT 40 GeV/c AND $p\vec{p} \to \pi^0 X$ AT 70 GeV/c

Spokesperson: A.N. Vasiliev [Serpukhov, IFVE]

E-mail contact vasiliev@mx.ihep.su

SERPUKHOV-155 (Completed data-taking 1992)

SINGLE AND PAIR HADRON PRODUCTION WITH LARGE MOMENTUM TRANSFER IN PROTON AND π^- MESON BEAMS

Spokesperson: V.I. Kryshkin [Serpukhov, IFVE]

E-mail contact kryshkin@mx.ihep.su

SERPUKHOV-161 (Taking data)

STUDY OF CHARMED PARTICLE PRODUCTION AT IHEP ACCELERATOR ENERGIES

Spokespersons: A.M. Moiseev [Serpukhov, IFVE], P.F. Ermolov [Moscow State U.], I.V. Boguslavsky [Dubna, JINR]

E-mail contact moiseev@mx.ihep.su, ermolov@sgi.npi.msu.su, boguslav@lhe08.jinr.dubna.su

SERPUKHOV-171 (Taking data)

DETERMINATION OF ENERGY DEPOSITION IN THICK TARGETS FROM CONSTRUCTION MATERIALS EXPOSED TO PROTONS WITH KINETIC ENERGIES OF 0.8-1.2 GeV/c

Spokesperson: V.I. Belyakov-Bodin [Moscow, ITEP]

E-mail contact belyakov_b@vxitep.itep.ru

SERPUKHOV-174 (Completed data-taking 1991)

PHYSICS OF RELATIVISTIC DIMESON ATOMS

Spokesperson: L.L. Nemenov [Dubna, JINR]

E-mail contact nemenov@nusun.jinr.dubna.su

SERPUKHOV-175 (Taking data)

SINGLE AND PAIR HADRON PRODUCTION WITH LARGE MOMENTUM TRANSFER IN POLARIZED PROTON BEAM

Spokesperson: V.I. Kryshkin [Serpukhov, IFVE]

E-mail contact kryshkin@mx.ihep.su

Selected SLAC Experiments

SLAC-E-142

(Proposed Oct 1989, Approved May 1990, Began data-taking Nov 1992, Completed data-taking Dec 1992)

MEASUREMENT OF THE NEUTRON SPIN DEPENDENT STRUCTURE FUNCTION

AMERICAN U – R G Arnold, P E Bosted, J Dunne, C E Keppel, S E Rock, M Spengos, Z M Szalata, J L White
BONN U – W Meyer
CLERMONT-FERRAND U – V Breton, H Fonvieille
HARVARD U – A K Thompson
LBL – G Shapiro
LIVERMORE – P L Anthony, F Dietrich, K van Bibber
MICHIGAN U – T E Chupp
PRINCETON U – G Cates, H L Middleton, N Newbury
SACLAY – H Borel, R Lombard-Nelsen, J Marroncle, J Morgenstern, F M Staley, Y D Terrien
SLAC – R A Gearhart, E W Hughes (√ Spokesperson), T Maruyama, G M Petratos, R Pitthan, L S Rochester, S H Rokni, M B Woods, C C Young
STANFORD U – D M Kawall, S Kuhn, Z E Meziani
SYRACUSE U – R Holmes, P A Souder, J Xu
WISCONSIN U – H Band, J R Johnson, R A Mair, R Prepost, G H Zapalac

Accelerator SLAC *Detector* Double-arm spectrometer

Reactions Polarized beam and target
e^- ^{3}He 22.66 GeV/c (P_{lab})

Particles studied *n*

Brief description Studies a polarized electron beam scattering off a polarized ^{3}He gas target. The scattered electrons are detected by a two-arm fixed spectrometer. Tests the Bjorken polarization sum rule and nucleon spin models. Run for 400 hours. Data analysis in progress (July 96).

Journal papers PRL 71 (1993) 959, and NC 107A (1994) 2197.

Related experiments SLAC-E-154

E-mail contact emlyn@slac.stanford.edu

SLAC-E-143

(Proposed Nov 1991, Approved Dec 1991, Began data-taking Nov 1993, Completed data-taking Feb 1994)

MEASUREMENTS OF THE NUCLEON SPIN STRUCTURE IN END STATION A AT SLAC

E143 COLLABORATION
AMERICAN U – R G Arnold (√ Spokesperson), P E Bosted, J Dunne, J Fellbaum, D Reyna, S E Rock, M Spengos, Z M Szalata, J L White
BASEL U – A Feltham, I Sick, P Steiner, B Zihlmann
CLERMONT-FERRAND U – V Breton, C Comptour, H Fonvieille, Y Roblin
CEBAF – J Gomez, J H Mitchell
DAPNIA, SACLAY – H Borel, P Grenier, R Lombard-Nelsen, J Marroncle, J Morgenstern, F M Staley, Y D Terrien
LIVERMORE – F Dietrich
MASSACHUSETTS U, AMHERST – J Bauer, J Button-Shafer
MICHIGAN U – T E Chupp, K P Coulter, T B Smith
OLD DOMINION U – C E Hyde-Wright, A Klein, S Kuhn, B Raue
PENN U – R Antonov, K A Griffioen, P Raines
SLAC – P L Anthony, J Clendenin, M Daoudi, H Dutz, R Erbacher, R A Gearhart, E W Hughes, T Maruyama, W Meyer, G M G Petratos, R Pitthan, C Prescott, L S Rochester, S J St Lorant, L M Stuart, H Tang, T Usher, D R Walz, K Witte, C C Young, B Youngman
STANFORD U – D M Kawall
TEMPLE U – Z E Meziani
TOHOKU U – K Abe, T Akagi, M Kuriki, F Suekane, H Yuta
VIRGINIA U – T Averett, J P Chen, D G Crabb, D B Day, E Frlež, R A Lindgren, T J Liu, J S McCarthy, R C Minehart, D Počanić, O A Rondon (√ Spokesperson), L C Smith, D Zimmerman
WISCONSIN U – H Band, J R Johnson, R Prepost, G H Zapalac

Accelerator SLAC *Detector* Spectrometer

Reactions Polarized beam and target
e^- deut 9.7, 16.2, 29.1 GeV (E_{lab})
e^- *p* "

Particles studied *p*, *n*

Brief description Uses high-energy polarized electron beams and a set of ammonia based polarized proton and deuteron targets. Both parallel and perpendicular beam–target spin orientations are used. Studies the proton and neutron spin structure over the range $0.03 \leq x \leq 0.8$ at momentum transfers greater than 0.3 $(GeV/c)^2$. Data analysis in progress (July 96).

Journal papers PRL 74 (1995) 346, PRL 75 (1995) 25, PL B364 (1995) 61, and PRL 76 (1996) 587.

Related experiments SLAC-E-142, SLAC-E-154, SLAC-E-155, CERN-NA-037, CERN-NA-047

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WWW Home-page
http://www.slac.stanford.edu/exp/e143/home.html

SLAC-E-154

(Proposed Oct 1993, Approved Nov 1993, Began data-taking Oct 1995, Completed data-taking Nov 1995)

PRECISION MEASUREMENT OF THE NEUTRON SPIN STRUCTURE FUNCTION USING A POLARIZED ^3He TARGET

AMERICAN U – R G Arnold, P E Bosted, J N Fellbaum, D Reyna, S E Rock, L Sorrell, Z M Szalata, T Toole
UC, BERKELEY & LBL – G Shapiro
CAL TECH – T Averett
CLERMONT-FERRAND U – V Breton, H Fonvieille, S Incerti
GRENOBLE U – M J Buenerd
KENT STATE U – B D Anderson, M Khayat, M D Manley, M Olson, G G (M) Petratos, J W Watson, W-M Zhang
MASSACHUSETTS U – C M Berisso, S Churchwell, Y Kolomensky, G Peterson
MICHIGAN U – T E Chupp, K Coulter, T B Smith, R Welsh
MIT, LNS – B Brau
NIST, WASH, DC – A K Thompson
OLD DOMINION U – S E Kuhn, B Raue, F Wesselmann
PENN U – P Raines
PRINCETON U – P Bogorad, G D Cates, K Kumar, H Middleton, M Romalis
RUHR U, BOCHUM – W Meyer
SACLAY – H Borel, R Lombard-Nelsen, J Marroncle, F Sabatie, F Staley, Y Terrien
SLAC – T Akagi, P L Anthony, M Daoudi, R Erickson, R Gearhart, R Hicks, E W Hughes (√ Spokesperson), G Igo, T Maruyama, D Miller, R Pitthan, L Rochester, S H Rokni, J Shaw, S St Lorant, L M Stuart, T Usher, K Witte, C C Young, B Youngman
SMITH COLL – P Decowski
SOUTHERN OREGON STATE COLL – T Marvin
SYRACUSE U – R Holmes, P A Souder, XJ (J) Wang
TEMPLE U – J Martoff, Z-E Meziani, P Zyla
TOHOKU U – K Abe, M Kuriki, F Suekane, H Yuta
UCLA – V Ghazikhanian
WILLIAM AND MARY COLL – K Griffioen
WISCONSIN U – H R Band, J R Johnson, G Mitchell, R Prepost

Accelerator SLAC *Detector* Spectrometer

Reactions Polarized beam and target
e^- ^{3}He 48.6 GeV (E_{lab})

Particles studied *n*

Brief description Measures the neutron spin structure function g_1^n over x ranging from 0.015 to 0.7 and Q^2 ranging from 1

to 16 $(GeV/c)^2$. Provides also a precision test of the Bjorken sum rule at high average Q^2 at about 5 $(GeV/c)^2$, and allows an extraction of the quark parton model parameters, Δ s and Δ q. Uses the 82% polarized electron beam in the upgraded A-line. The target polarization is achieved by way of the optical pumping and spin exchange. Data analysis in progress (July 96).

Related experiments SLAC-E-142, SLAC-E-143, SLAC-E-155, CERN-NA-047, DESY-HERA-HERMES

E-mail contact emlyn@slac.stanford.edu

WWW Home-page
http://www.slac.stanford.edu/exp/e154/home.html

SLAC-E-155

(Proposed Oct 1993, Approved Nov 1993, In preparation)

MEASUREMENTS OF THE NUCLEON SPIN STRUCTURE IN END STATION A AT SLAC

AMERICAN U – R G Arnold (Spokesperson), P E Bosted, J Dunne, J Fellbaum, D Reyna, S E Rock, M Spengos, Z M Szalata, J L White
BASEL U – A Feltham, I Sick, P Steiner, B Zihlmann
BONN U – W Meyer
CEBAF – J Gomez
CLERMONT-FERRAND U – V Breton, C Comptour, H Fonvieille, Y Roblin
LIVERMORE – P L Anthony, F Dietrich
MASSACHUSETTS U, AMHERST – J Bauer, J Button-Shafer
MICHIGAN U – T E Chupp, K P Coulter, T B Smith
NAVAL POSTGRADUATE SCHOOL – D Garvey, X K Maruyama
OLD DOMINION U – C E Hyde-Wright, A Klein, B Raue
PENN U – R Antonov, K A Griffioen, P Raines
DAPNIA, SACLAY – T Akagi, H Borel, R Erbacher, P Grenier, R Lombard-Nelsen, J Marroncle, J Morgenstern, F M Staley, Y D Terrien
SLAC – J Clendenin, G Court, M Daoudi, H Dutz, R A Gearhart, E W Hughes, T Maruyama, G M G Petratos, R Pitthan, C Prescott, A Rijllart, L S Rochester, S J St Lorant, L M Stuart, H Tang, T Usher, D R Walz, K Witte, C C Young, B Youngman
STANFORD U – D M Kawall, S Kuhn, Z E Meziani
TOHOKU U – K Abe, M Kuriki, F Suekane, H Yuta
VIRGINIA U – T Averett, J P Chen, D G Crabb, D B Day, E Frlež, S Hoibraten, R A Lindgren, T J Liu, J S McCarthy (Spokesperson), R C Minehart, J H Mitchell, D Počanić, O A Rondon, L C Smith, D Zimmerman
WISCONSIN U – H Band, J R Johnson, R Prepost, G H Zapalac

Accelerator SLAC *Detector* Spectrometer

Reactions Polarized beam and target

$e^- n$	48.55 GeV (E_{lab})
$e^- p$	"

Particles studied n, p

Brief description Measures the deep inelastic scattering of polarized electrons from polarized ammonia targets, NH_3 and ND_3, to determine the spin structure functions g_1 and g_2 over x ranging from 0.015 to 0.85 and Q^2 ranging from 1 to 17 $(GeV/c)^2$. The data will double the Q^2 range of precision measurements and allow a search for nonscaling higher twist contributions to the spin structure functions. Uses a new pair of focussing magnetic spectrometers instrumented with shower counters, Čerenkov counters, and scintillator hodoscopes to measure scattered electrons and reject pions. In preparation (July 96). Scheduled to run in January 97.

Related experiments SLAC-E-142, SLAC-E-143, SLAC-E-154, CERN-NA-037, CERN-NA-047

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SLAC-SLC-SLD

(Proposed 1983, Approved May 1984, Began data-taking Apr 1991, In progress)

THE SLD DETECTOR FOR THE SLC

SLD COLLABORATION
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BRUNEL U – N J Allen, P Dervan, E Etzion, A Hasan, A K McKemey, C Ward, S J Watts
COLORADO U – S Fahey, U Nauenberg, D Wagner
COLORADO STATE U – M Dima, J Harton, M Smy, H Staengle, R J Wilson
COLUMBIA U – P C Rowson
FERRARA U & INFN, FERRARA – G Menegatti, L Piemontese
FRASCATI – A Calcaterra, R De Sangro, I Peruzzi, M Piccolo
LBL – G Shapiro, H Steiner
LOUISIANA TECH U – B Barakat, X- Jiang, K Johnston
MASSACHUSETTS U, AMHERST – G Blaylock, S S Hertzbach, R R Kofler, A Trandafir, J Wittlin
MIT – P N Burrows, R F Cowan, J Dagraca, D Dong, M J Fero, H W Kendall, V Lia, L S Osborne, J Quigley, F E Taylor, E Torrence, R Verdier, R K Yamamoto
MISSISSIPPI U – B Bolen, R Kroeger, J Reidy
MOSCOW STATE U – G Bashindzhagyan
NAGOYA U – K Abe, R Kajikawa, N Oishi, A Sugiyama, S Suzuki
OREGON U – A Arodzero, J E Brau, R Frey, J Huber, M Langston, N B Sinev, X- Yang, J- Zhou
PERUGIA U & INFN, PERUGIA – D Falciai, G Mancinelli, G Mantovani
RUTGERS U – K G Baird, P Jacques, M Kalelkar, R J Plano, P Stamer
RUTHERFORD – C J S Damerell, D J Jackson, F J Wickens
SLAC – T Akagi, D Aston, T L Barklow, J R Bogart, G R Bower, M Breidenbach (√ Spokesperson), D Burke, D H Calloway, R Cassell, A Chou, G Crawford, M Daoudi, N DeGroot, R Dubois, M E Huffer, J A Jaros, J Jiang, A S Johnson, H Kawahara, M E King, D W G Leith, H L Lynch, T W Markiewicz, T Maruyama, R Messner, K C Moffeit, D Muller, T J Pavel, C Y Prescott, B N Ratcliff, L S Rochester, J J Russell, O H Saxton, J Schwiening, D Su, M Swartz, T Usher, J Va'Vra, S R Wagner, A P Waite, S H Williams, S Willocq, W J Wisniewski, M B Woods, C C Young
SOGANG U – Y- Kim, C H Park
TENNESSEE U – B Bugg, H O Cohn, E L Hart, L Kamychkov, D Onoprienko, K Shmakov, A W Weidemann
TOHOKU U – K Abe, K Hasuko, T Nagamine, S Narita, F Suekane, J Yashima, H Yuta
UC, SANTA BARBARA – S J Yellin
UC, SANTA CRUZ – D G Coyne, J Fernandez, X Liu, P L Reinertsen, T Schalk
VANDERBILT U – R S Panvini, T W Reeves
WASHINGTON U, SEATTLE – T H Burnett, E Church, V Cook, P M Mockett, E R Weiss
WISCONSIN U – H R Band, J R Johnson, R Prepost, V Serbo, T Wright
YALE U – C Baltay (√ Spokesperson), M Liu, S Manly, T Moore, J A Snyder

Accelerator SLAC-SLC *Detector* SLD

Reactions Polarized beam

$e^+ e^-$	<100 GeV (E_{cm})

Particles studied Z^0

Brief description Studies include (1) precision tests of the Standard Model of the electroweak interactions and the Z partial width to bottom states, particularly by measuring the left–right polarization asymmetry A_{LR}, (2) heavy quark physics of the B system, (3) B $\bar{B}$ mixing with polarized beams, (4) tests of QCD in multi-jets, and (5) a search for new phenomena. The detector system consists of a high-precision upgraded CCD vertex detector (VXD3), a cylindrical central drift chamber with four circular endcap drift chambers, a Čerenkov ring imaging detector, finely segmented projective tower geometry calorimetry, and a muon tracking system. Taking data (July 96). Expected to run till March 98.

Journal papers NIM A238 (1985) 489, IEEE TNS 33 (1986) 46, IEEE TNS 33 (1986) 65, IEEE TNS 33 (1986) 81, IEEE TNS 33 (1986) 113, IEEE TNS 33 (1986) 167, IEEE TNS 33 (1986) 176, IEEE TNS 33 (1986) 194, IEEE TNS 33 (1986) 197, IEEE TNS 33 (1986) 201, IEEE TNS 33 (1986) 261, NIM A252 (1986) 295, NIM A257 (1987) 139, NIM A257 (1987) 625, IEEE TNS 35 (1988) 231, IEEE TNS 35 (1988) 282, IEEE TNS 35 (1988) 311, IEEE TNS 35 (1988) 398, NIM A264 (1988) 219, NIM A265

(1988) 99, NIM A273 (1988) 858, IEEE TNS 36 (1989) 23, IEEE TNS 36 (1989) 276, IEEE TNS 36 (1989) 339, IEEE TNS 36 (1989) 595, IEEE TNS 36 (1989) 675, IEEE TNS 36 (1989) 751, IEEE TNS 36 (1989) 822, IEEE TNS 36 (1989) 1657, NIM A275 (1989) 484, NIM A276 (1989) 94, NIM A277 (1989) 222, NIM A283 (1989) 582, NIM A283 (1989) 590, NIM A284 (1989) 339, IEEE TNS 37 (1990) 1132, IEEE TNS 37 (1990) 1191, NIM A288 (1990) 236, NIM A289 (1990) 449, NIM A289 (1990) 463, NIM A289 (1990) 577, NIM A290 (1990) 353, NIM A293 (1990) 136, IEEE TNS 38 (1991) 348, NP (PROC SUPPL) 23B (1991) 219, NP (PROC SUPPL) 23B (1991) 227, NIM A300 (1991) 501, NIM A328 (1993) 472, MPL A8 (1993) 2237, PRL 70 (1993) 2515, PRL 71 (1993) 2528, NP (PROC SUPPL) 37B (1994) 23, PRL 72 (1994) 3145, PRL 73 (1994) 25, PR D50 (1994) 5580, NP (PROC SUPPL) 39BC (1995) 121, PRL 74 (1995) 1512, PRL 74 (1995) 2880, PRL 74 (1995) 2890, PRL 74 (1995) 2895, PRL 75 (1995) 3609, PRL 75 (1995) 3624, PRL 75 (1995) 4173, PR D51 (1995) 962, PR D52 (1995) 4240, PR D52 (1995) 4828, PL B371 (1996) 149, PR D53 (1996) 1023, and PR D53 (1996) 2271.

Related experiments CERN-LEP-ALEPH, CERN-LEP-DELPHI, CERN-LEP-L3, CERN-LEP-OPAL

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WWW Home-page
http://www-sld.slac.stanford.edu/sldwww/sld.html

SLAC-PEP2-BABAR

(Proposed Jun 1994, Jun 1994, Approved Jan 1996, In preparation)

THE B FACTORY DETECTOR

BABAR COLLABORATION

Accelerator SLAC-PEP2 *Detector* BABAR

Brief description BABAR is a detector designed to exploit the single interaction region in the PEP2 facility. The primary aim is a detailed study of CP violating asymmetries in B^0 meson decay, but a wide variety of other B, charm, τ, and two-photon physics will also be accessible. The detector comprises a nested set of detector subsystems to (1) precisely measure the collision point and decay points of the B meson pairs produced, (2) measure the momentum and energy of the decay particles with a high resolution, and (3) precisely identify particles in these decays (i.e. electrons, muons, pions, kaons). The machine will be commissioned Fall 1998 and the detector should be ready to begin the studies in early 1999. Under construction (July 96). The collaboration consists of more than 500 scientists, engineers, and graduate students from 10 countries. For further details, please contact the Spokesperson, Prof. David G. Hitlin [Cal Tech]. The Deputy Spokesperson is Dr. Roy Aleksan [Saclay].

E-mail contact hitlin@slac.stanford.edu

WWW Home-page
http://www.slac.stanford.edu/BF/doc/www/bfHome.html

Other SLAC Experiments

Listed here are some other SLAC experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons.

SLAC-E-140X (Completed data-taking Sep 1991)

MEASUREMENT OF THE x, Q^2, AND HYDROGEN–DEUTERIUM DEPENDENCE OF $R = \sigma_L/\sigma_T$

Spokespersons: Stephen E. Rock [American U.], Arie Bodek [Rochester U.]

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SLAC-E-144 (Taking data)

STUDY OF QED AT CRITICAL FIELD STRENGTH IN INTENSE LASER – HIGH-ENERGY ELECTRON COLLISIONS AT SLAC

By E144 Collaboration

Spokespersons: Kirk T. McDonald [Princeton U.], Adrian C. Melissinos [Rochester U.], David L. Burke [SLAC]

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WWW Home-page
http://www.slac.stanford.edu/exp/e144/e144.html

SLAC-E-146 (Completed data-taking Apr 1993)

STUDY OF THE INTERFERENCE BETWEEN MULTIPLE SCATTERING AND BREMSSTRAHLUNG (LPM EFFECT)

Spokesperson: Spencer R. Klein [LBL, Berkeley]

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SLAC-NE-17 (Completed data-taking Oct 1991)

TWO-BODY PHOTODISINTEGRATION OF THE DEUTERON AT FORWARD ANGLES BETWEEN 1.0 AND 3.0 GeV

Spokesperson: Roy J. Holt [Argonne]

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SLAC-NE-18 (Completed data-taking Oct 1991)

MEASUREMENT OF THE NUCLEAR DEPENDENCE AND MOMENTUM TRANSFER DEPENDENCE OF QUASIELASTIC $(e, e'p)$ SCATTERING AT LARGE MOMENTUM TRANSFER

Spokespersons: Richard G. Milner [MIT, LNS], Bradley W. Filippone [Cal Tech]

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SLAC Future Plans

In the next few years SLAC will continue to support a series of complementary high-energy physics programs: (1) studies of the spin structure of nucleons using the high current, high energy, polarized electron-beam scattering from polarized neutron and proton targets, (2) study of the electro-weak interaction with the SLD detector through precision measurements at the Z pole, using polarized electron collisions on unpolarized positrons at the energy of the Z, (3) accelerator R&D towards a real linear collider (NLC), (4) preparations to study time-dependent X-ray sources with the USA experiment to be launched in 1997, and R&D towards a new space experiment studying high-energy γ rays - a follow on to the very successful EGRET experiment now orbiting earth, and (5) activity related to the development of the far-future high-gradient accelerators. The spin structure and SLD experiments are scheduled to run through March 1998. The asymmetric B Factory (PEP2) is expected to be commissioned before the end of that year, and the BaBar detector should begin its study of the CP-violation phenomena in early 1999.

Selected TRIUMF Experiments

TRIUMF-497-287

(Proposed Oct 1987, Approved Dec 1987, Began data-taking 1995, In progress)

MEASUREMENT OF THE FLAVOR-CONSERVING HADRONIC WEAK INTERACTION

PARITY COLLABORATION

MANITOBA U – J Birchall (√ Spokesperson), J R Campbell, A A Green, A Hamian, L R Lee, S A Page (√ Spokesperson), W D Ramsay, S D Reitzner, V Sum, W T H van Oers (√ Spokesperson), R Woo
LOS ALAMOS – J D Bowman, R E Mischke
TRIUMF – C A Davis, D C Healey, R Helmer, P Levy, P W Schmor
ALBERTA U – P W Green, E Korkmaz, G Roy, J Soukup, G M Stinson
CARNEGIE MELLON U – A Berdoz
MOSCOW, INR – Y Kuznetzov, N Titov, S Zadorozny, A Zelenski

Accelerator TRIUMF *Detector* Ionization

Reactions Polarized beam

$p\ p \rightarrow p\ p$	221 MeV (T_{lab})

Brief description Measures the parity violating (PV) longitudinal analyzing power A_z and the weak meson–nucleon coupling constant h_ρ^{pp}. Uses a new beamline dedicated to the PV measurements, and a liquid hydrogen target. In progress (July 96).

Journal papers PR D37 (1988) 1769, NIM A307 (1991) 26, and NP A553 (1993) 823c.

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TRIUMF-537

(Proposed May 1988, Completed data-taking Jun 1991)

RADIATIVE DECAY OF THE Δ RESONANCE

BRITISH COLUMBIA U – D F Measday (Spokesperson), S Stanislaus, P Weber
KENTUCKY U – M A Kovash
NEW MEXICO U – B Bassalleck
BOSTON U – E C Booth, J P Miller

Accelerator TRIUMF *Detector* Photon spectrometer

Reactions Polarized target

$\pi^-\ p \rightarrow n\ \gamma$	100–250 MeV (T_{lab})
$\pi^-\ p \rightarrow \pi^0\ n$	"

Brief description Measures Δ^0 radiative decay multipoles and differential cross-sections. A polarized target has been successfully used in phase-II of the experiment. Data analysis in progress (July 96).

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TRIUMF-614

(Proposed Jun 1990, Approved Dec 1993, In preparation)

PRECISION MEASUREMENT OF THE MICHEL PARAMETERS IN μ^+ DECAY

TRIUMF – R Abegg, M Comyn, D R Gill (√ Spokesperson), P Gumplinger, R Helmer, J Macdonald, J-M Poutissou, R Poutissou, G Wait, D Wright
TEXAS A AND M – C Gagliardi (√ Spokesperson), R Tribble (√ Spokesperson)
BRITISH COLUMBIA U – M Hasinoff
VALPARAISO U, INDIANA – D Koetke, R Manweiler
KURCHATOV INST, MOSCOW – A Khruchinsky, Y Lechin, L Miassoedov, V Selivanov (√ Spokesperson), I Sinitzin, V Torokhov
ALBERTA U – N Rodning
SASKATCHEWAN U – Y M Shin
REGINA U & TRIUMF – R Tacik

Accelerator TRIUMF *Detector* Spectrometer

Brief description Tests the right-left models of weak interactions. A surface muon beam is used as a source of muons with polarization almost completely (better than 99.99%) opposite to the muon momentum. The experimental apparatus is contained in a superconducting solenoid with a maximum field of 2.3 T, collinear to the muon polarization. Muons stop in a thin planar aluminum target located in the center of the magnet, and the resulting positrons are recorded by one of the two planar drift chamber (PDC) assemblies located on both sides of the target. Under construction. Data taking expected in Fall 1997.

Related experiments LAMPF-1240

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TRIUMF-645

(Proposed Jun 1991, Approved Jun 1991, Began data-taking May 1992, Completed data-taking Jun 1992)

ABSOLUTE DIFFERENTIAL CROSS-SECTIONS IN THE $\pi^\pm p \rightarrow \pi^\pm p$ REACTION AROUND THE Δ RESONANCE

PISCAT COLLABORATION

BRITISH COLUMBIA U – F Duncan, A Feltham, G Jones, J Lange, M M Pavan (√ Spokesperson), K Raywood, M E Sevior
TRIUMF – R Adams, J T Brack (√ Spokesperson), D Ottewell, G R Smith, B Wells
REGINA U – E L Mathie, R Tacik
COLORADO U – R A Ristinen
KARLSRUHE U – H M Staudenmaier
ST PETERSBURG, INP – I I Strakovsky
SIMON FRASER U – R Helmer

Accelerator TRIUMF *Detector* Scintillator

Reactions

$\pi^+\ p \rightarrow \pi^+\ p$	141–267 MeV (T_{lab})
$\pi^-\ p \rightarrow \pi^-\ p$	"

Brief description Uses flat, solid CH_2 (polyethylene) targets as well as a supercooled flat-window liquid hydrogen target. Scintillator telescopes are used for coincidence detection of pions and protons. Covers angular range between 30° and 160° c.m. Anticipates 1–1.5% statistical and 1.5–2.0% systematic uncertainties. Data analysis completed and a publication being prepared (July 96).

Related experiments TRIUMF-322, TRIUMF-471

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TRIUMF-703

(Proposed May 1993, Approved Jul 1993, Began data-taking Dec 1993, In progress)

PION LIFETIME MEASUREMENT

TRIUMF – D A Bryman, M Fujiwara, J A Macdonald, G Marshal, T Numao (√ Spokesperson), A Olin

Accelerator TRIUMF *Detector* Counter

Reactions

$\pi^+ \rightarrow e^+\ \nu$	—

Particles studied π^+

Brief description The pion lifetime is measured by observing the time dependence of the surface muon yield. Taking data (July 96).

Journal papers PR D52 (1995) 4855.

Related experiments TRIUMF-248

E-mail contact toshio@triumf.ca

Other TRIUMF Experiments

Listed here are some other TRIUMF experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. Check also the yearly TRIUMF publication 'Annual Report of Scientific Activities', which lists all the Lab's ongoing experiments.

TRIUMF-369 (Completed data-taking Mar 1993)

CHARGE SYMMETRY BREAKING IN np ELASTIC SCATTERING AT 350 MeV

Spokespersons: Willem T.H. van Oers [Manitoba U.], L.Gordon Greeniaus [Alberta U.]

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TRIUMF-372 (Completed data-taking Feb 1991)

SINGLE PION PRODUCTION IN np SCATTERING

Spokesperson: Norman E. Davison [Manitoba U.]

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TRIUMF-445 (Completed data-taking Dec 1993)

POLARIZATION MEASUREMENT IN THE $^3\mathrm{He}(\pi^+, \vec{p}p)p$ REACTION

Spokespersons: D. Ashery, S. MayTal-Beck [Tel Aviv U.]

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TRIUMF-452 (Completed data-taking Feb 1994)

RADIATIVE MUON CAPTURE ON HYDROGEN
By RMC Collaboration

Spokespersons: Michael D. Hasinoff [British Columbia U.], Georges Azuelos [Montreal U.]

E-mail contact miha@triumf.ca, azuelos@lps.umontreal.ca

TRIUMF-482 (Completed data-taking Sep 1991)

MEASUREMENTS OF SPIN TRANSFER COEFFICIENTS IN pd ELASTIC SCATTERING

Spokesperson: Rudolf Abegg [TRIUMF]

E-mail contact abegg@triumf.ca

TRIUMF-498 (Completed data-taking 1993)

ANALYZING POWER ZERO CROSSING ANGLES IN np ELASTIC SCATTERING BELOW 300 MeV

Spokesperson: Charles A. Davis [TRIUMF]

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TRIUMF-502 (Completed data-taking 1992)

MEASUREMENT OF ANALYZING POWERS IN LOW ENERGY πd ELASTIC SCATTERING

Spokesperson: N.R. Stevenson [Saskatchewan U.]

TRIUMF-506 (Completed data-taking 1991)

LOW ENERGY $\pi d \to pp$ ANALYZING POWERS

Spokesperson: Edward L. Mathie [Regina U.]

E-mail contact mathie@meena.cc.uregina.ca, mathie@triumf.ca

TRIUMF-508

STUDY OF THE $\pi^+ d \to \pi^-\pi^+pp$ REACTION AT $T = 240$ MeV

Spokesperson: Rinaldo Rui [Trieste U.]

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TRIUMF-557 (Completed data-taking 1992)

ELASTIC SCATTERING OF 100 MeV π^+ FROM A POLARIZED ^{3}He TARGET

Spokespersons: Otto F. Haeusser [TRIUMF and Simon Fraser U.], B. Larson [Simon Fraser U.]

E-mail contact hausser@triumf.ca

TRIUMF-560 (Completed data-taking 1994)

LOW ENERGY π^+p ANALYZING POWERS WITH CHAOS

Spokesperson: G.R. Smith [TRIUMF]

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TRIUMF-561 (Completed data-taking Feb 1991)

THRESHOLD MEASUREMENTS OF $\mathrm{H}(\pi^-, \pi^+\pi^-)n$ AND $\mathrm{H}(\pi^+, \pi^+\pi^+)n$

Spokesperson: Martin E. Sevior [British Columbia U.]

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TRIUMF-566

ELASTIC PROTON SCATTERING FROM POLARIZED ^{3}He

Spokesperson: Otto F. Haeusser [Simon Fraser U. and TRIUMF]

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TRIUMF-570 (Completed data-taking Jan 1993)

GAMMA–NEUTRINO ANGULAR CORRELATION IN MUON CAPTURE ON ^{28}Si

Spokesperson: David S. Armstrong [LBL, Berkeley]

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TRIUMF-592 (Completed data-taking 1995)

RADIATIVE MUON CAPTURE ON ^{3}He
By RMC Collaboration

Spokesperson: Dennis H. Wright [TRIUMF]

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TRIUMF-598 (Completed data-taking Aug 1992)

INTEGRAL CROSS-SECTIONS FOR THE π^+p INTERACTION IN THE 3,3 RESONANCE REGION

Spokesperson: Eli Friedman [Hebrew U.]

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TRIUMF-612 (Completed data-taking 1994)

HYPERFINE DEPENDENCE OF EXCLUSIVE MUON CAPTURE ON ^{19}F, ^{23}Na, ^{27}Al, ^{35}Cl, AND ^{37}Cl

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SUMMARIES OF TRIUMF EXPERIMENTS

TRIUMF-624 (Completed data-taking Aug 1994)

THE $(\pi, 2\pi)$ REACTION, A TOOL TO DETERMINE SCATTERING LENGTHS AND COUPLING CONSTANTS

Spokespersons: Richard R. Johnson, Martin E. Sevior [British Columbia U.], Nevio Grion, Rinaldo Rui [Trieste U.]

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TRIUMF-630 (Completed data-taking 1994)

ELASTIC PROTON SCATTERING FROM SIDEWAYS AND LONGITUDINALLY POLARIZED ^{3}He

Spokesperson: D.M. Whittal [Simon Fraser U.]

TRIUMF-633

MEASUREMENT OF $pp \to pn\pi^+$ AT 420 AND 500 MeV

Spokesperson: Kenneth H. Hicks [Ohio U.]

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TRIUMF-643 (Completed data-taking 1992)

TEST OF THE LOW ENERGY THEOREM FOR RADIATIVE PION CAPTURE

Spokespersons: David A. Hutcheon [TRIUMF], Michael A. Kovash [Kentucky U.]

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TRIUMF-653 (Completed data-taking Aug 1993)

MEASUREMENT OF THE $\pi^+\pi^-$ INVARIANT MASS IN NUCLEI AS A TOOL FOR DETERMINING THE MASS DISTRIBUTION OF THE σ MESON

Spokespersons: Nevio Grion, Rinaldo Rui [Trieste U.]

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TRIUMF-661 (Completed data-taking Jun 1994)

NEUTRON–NEUTRON SCATTERING LENGTH VIA $\pi^- d \to \gamma nn$

Spokesperson: Michael A. Kovash [Kentucky U.]

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TRIUMF-683 (Completed data-taking Sep 1994)

ASYMMETRIES FOLLOWING MUON CAPTURE BY POLARIZED MUONIC ^{3}He

Spokespersons: W. Cummings [Simon Fraser U.], O.F. Hausser [Simon Fraser U. and TRIUMF]

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TRIUMF-704 (In preparation)

CHARGE SYMMETRY BREAKING IN $np \to d\pi^0$ CLOSE TO THRESHOLD

By SASP-CSB Collaboration

Spokespersons: Allena K. Opper [Alberta U.], Elie Korkmaz [Northern British Columbia U.]

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TRIUMF-719 (Completed data-taking 1995)

^{4}He$(\pi^+, \pi^- pp)$ INVARIANT MASS MEASUREMENT WITH CHAOS

Spokesperson: Greg R. Smith [TRIUMF]

E-mail contact smith@triumf.ca

Nonaccelerator Experiments

UNDERGROUND-BOREXINO

(In preparation)

BOREXINO: A SOLAR NEUTRINO EXPERIMENT AT GRAN SASSO

BOREXINO COLLABORATION

Brief description BOREXINO is one of the 'next generation' solar neutrino projects at the Gran Sasso Laboratory. Uses a Pseudocumene based liquid scintillator as active medium. Measures the ^{7}Be line neutrino flux (energy = 0.861 MeV). It is very sensitive to the neutrino oscillations in both the scenarios of vacuum oscillations and the MSW effect. Tests of the feasibility of the project have been successfully completed. For further information, please contact the Spokesperson, Prof. Gianpaolo Bellini [Milan U. and INFN, Milan].

Related experiments SAGE, GALLEX, SUDBURY, KAMIOKANDE, SUPERKAMIOKANDE

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WWW Home-page
http://www.lngs.infn.it/lngs/htexts/borex/html/borex.html

UNDERGROUND-GALLEX

(Proposed 1983, Approved Apr 1985, Began data-taking May 1991, In progress)

GALLIUM EUROPEAN EXPERIMENT

GALLEX COLLABORATION
HEIDELBERG, MAX PLANCK INST – W Hampel, G Heusser, J Kiko, T Kirsten (√ Spokesperson), M Laubenstein, E Pernicka, W Rau, U Roenn, M Wojcik, Y Zakharov
FORSCHUNGSZENTRUM, KARLSRUHE – K Ebert, T Fritsch, D Heidt, E Henrich, L Stieglitz, R von Ammon, F Weirich
GRAN SASSO – M Balata, F X Hartmann, M Sann
MILAN U – E Bellotti, C Cattadori, O Cremonesi, N Ferrari, E Fiorini, L Zanotti
MUNICH, TECH U – M Altmann, R Moessbauer, F von Feilitzsch
NICE OBSERVATORY – G Berthomieu, E Schatzman
ROME U & INFN, ROME – C Bacci, P Belli, R Bernabei, S D'Angelo, L Paoluzi
SACLAY – A Bevilacqua, M Cribier, L Gosset, J Rich, M Spiro, C Tao, D Vignaud
BROOKHAVEN – J Boger, R L Hahn, J K Rowley, R W Stoenner, J Weneser

Accelerator NONE *Detector* Counter

Reactions
ν_e ^{71}Ga → e^- ^{71}Ge —

Particles studied ν_e

Brief description This is a radiochemical neutrino experiment. Uses 30 tons of gallium in the 8.2-molar $GaCl_3$ solution. Installed in the South Wing of Hall A of the Gran Sasso Laboratory. Has an overhead shielding of about 3400 m of water equivalent. An interaction with neutrinos effectively transforms gallium chloride into $GeCl_4$, which is then extracted from the solution with an appropriate gas purging system. Counted in extremely low-level proportional counters. Sensitive to the low-energy neutrinos produced by *pp* fusion in the Sun. Designed for an order of one event per day. Taking data (July 96).

Journal papers NIM A274 (1989) 203, PL B285 (1992) 376, PL B285 (1992) 390, NIM A329 (1993) 541, PL B314 (1993) 445, PL B327 (1994) 377, NP (PROC SUPPL) 35 (1994) 418, PL B342 (1995) 440, PL B357 (1995) 237, and ASPP 4 (1995) 23.

Related experiments SAGE, BOREXINO

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WWW Home-page
http://kosmopc.mpi-hd.mpg.de/gallex/gallex.htm

UNDERGROUND-HOMESTAKE-CHLORINE

(Proposed 1965, Approved 1965, Began data-taking 1970, In progress)

THE HOMESTAKE CHLORINE SOLAR NEUTRINO EXPERIMENT

PENN U – B T Cleveland, T Daily, R Davis, Jr (√ Spokesperson), K Lande (√ Spokesperson), C K Lee, P Wildenhain
LEHMANN COLL – J Ullman

Accelerator NONE *Detector* Counter

Reactions
ν_e ^{37}Cl → e^- ^{37}Ar —

Particles studied ν_e

Brief description The ^{37}Cl solar neutrino detector in the Homestake Gold Mine consists of 615 tons of tetrachloroethylene (C_2Cl_4), 4200 m of water equivalent underground. It uses radiochemical techniques to determine the ^{37}Ar production rate. The detector was built at BNL in 1965-67 and operated by Brookhaven until 1984. At that time the laboratory was transferred to Penn U. Collecting data regularly since 1970.

Journal papers PRL 47 (1981) 1507, and ASTJ (1996) (to be published).

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UNDERGROUND-HOMESTAKE-IODINE

(Proposed 1993, Approved 1994, In preparation)

THE HOMESTAKE IODINE SOLAR NEUTRINO EXPERIMENT

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LEHMANN COLL – J Ullman
LOS ALAMOS – R Burman
WASHINGTON U, SEATTLE – W Haxton
MOSCOW, INR – V N Gavrin

Accelerator NONE *Detector* Counter

Reactions
ν_e ^{127}I → e^- ^{127}Xe —

Particles studied ν_e

Brief description The ^{127}I solar neutrino experiment in the Homestake Gold Mine uses a detector medium of sodium iodide dissolved in water. The total detector mass of the unit now under construction will be 235 tons of which 100 tons is ^{127}I. The detector is located 4200 m of water equivalent underground. It uses radiochemical techniques to determine the ^{127}Xe production rate. The detector, which has an extraction time constant of 11 minutes, will be fully automated and will operate under complete computer control. Two extractions will be carried out per day to search for a Day/Night effect for electron neutrinos from the decay of ^{7}Be. Expected to begin data taking at the end of 1996.

Related experiments LAMPF-1213, IUCF-E-373

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UNDERGROUND-ICARUS

(Approved 1995, In preparation)

ICARUS: IMAGING COSMIC AND RARE UNDERGROUND SIGNAL

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AQUILA U & INFN, AQUILA – F Cavanna, E Olejarczyk, G Piano Mortari, M Verdecchia

BEIJING, IHEP – L K Ding, Y Li, F Lu, J M Ma, J F Qiu, H Y Sheng, K L Tung, J Y Zeng, B Zhang
FRASCATI – F Casagrande, D Dzialo-Giudice, X Li, G Mannocchi, S Motto, P Picchi
UCLA – D Cline, W Hong, G Muratori, S Otwinowski, J Park, H G Wang, M Zhou
PADUA U & INFN, PADUA – A Bettini, C Carpanese, S Centro, C De Vecchi, D Pascoli, A Pepato, F Pietropaolo, S Ventura
PAVIA U & INFN, PAVIA – P Benetti, E Calligarich, R Dolfini, A Gigli-Berzolari, F Mauri, L Mazzone, C Montanari, A Piazzoli, A Rappoldi, G L Raselli, M Rossella, D Scannicchio, C Vignoli
PISA U & INFN, PISA – F Sergiampietri
TURIN, COSMO-GEOFISICA LAB – L Periale, S Suzuki
TEXAS U, DALLAS – E Feynyves
MILAN U & INFN, MILAN – D Cavalli, S Cesana, A Ferrari, F Gianotti, S Resconi, P Sala, M Terrani

Accelerator NONE *Detector* ICARUS

Particles studied p, ν

Brief description The first phase of the project includes the construction of a 600-ton detector at Gran Sasso Laboratory. This could be done within the next three years. In the second phase, a 5,000-ton detector will be built. The ICARUS detector represents a new generation of bubble chambers, and will use the ultra-pure liquid argon and the readout technique (LAr-TPC) of ionization data. It is designed to provide three-dimensional views of ionizing events with particle identification from dE/dx and range measurements. It is also a homogeneous calorimeter of very fine granularity and high accuracy, and thus a good tool for rare event searches, such as proton decays. Other topics covered include atmospheric neutrino studies and solar neutrino detection (above 5 MeV). It is expected that the detector will be used in a long baseline neutrino oscillation experiment with the ν beam from CERN (732-km to the North). Under construction (July 96).

Journal papers NIM A315 (1992) 223, NIM A327 (1993) 173, NIM A332 (1993) 395, NIM A333 (1993) 567, NIM A345 (1994) 230, NIM A346 (1994) 550, NIM A355 (1995) 660, NIM A356 (1995) 507, and NIM A356 (1995) 526.

Related experiments SUPERKAMIOKANDE

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WWW Home-page http://www.aquila.infn.it/icarus/

UNDERGROUND-KAMIOKANDE-III

(Began data-taking Nov 1985, Completed data-taking Apr 1996)

THE KAMIOKANDE EXPERIMENT

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TOKYO U, INS – E Ichihara, S Miyamoto, K Nishikawa
KEK – K S Hirata, K Kihara, Y Oyama
TOKAI U, SHIBUYA – T Horiuchi, M Koshiba, K Nishijima
KOBE U – T Suda, A T Suzuki
NIIGATA U – T Ishizuka, K Miyano, H Okazawa
OSAKA U – T Hara, Y Nagashima, M Takita, T Yamaguchi
TOKYO INST TECH – Y Hayato, K Kaneyuki, T Suzuki, Y Takeuchi, T Tanimori
GIFU U – S Tasaka
TOHOKU U – K Fujita, S Hatakeyama, M Koga, S Maruyama, A Suzuki
MIYAGI U OF EDUCATION – S Mori

Accelerator NONE *Detector* Counter

Reactions

$\nu\, e^- \rightarrow \nu\, e^-$	—
$\overline{\nu}_e\, p \rightarrow n\, e^+$	—

Particles studied p, n, monopole, muon, ν

Brief description A 3000-ton water Čerenkov detector, 2700 m of water equivalent underground. The KAMIOKANDE-I detector has been upgraded with new electronics, TDC's, and one thousand 20-inch phototubes surrounded by aluminized reflectors. Studies nucleon decays, solar, supernova, atmospheric and high-energy cosmic neutrinos, high-energy muons, *etc.* The second phase was completed in April 90, the third phase started in October 90. Data taking officially ended in April 96, but the detector is still capable of recording possible supernova neutrinos. Data analysis in progress (July 96).

Journal papers NIM 205 (1983) 443, JPSJ 54 (1985) 3213, JPSJ 54 (1985) 4065, PRL 56 (1986) 991, JPSJ 55 (1986) 711, JPSJ 55 (1986) 3786, PR D34 (1986) 902, PRL 58 (1987) 1490, PRL 59 (1987) 2604, PR D36 (1987) 3537, PL B205 (1988) 416, PRL 61 (1988) 385, PRL 61 (1988) 2653, PR D38 (1988) 448, PL B220 (1989) 308, PRL 63 (1989) 16, PR D39 (1989) 1481, ASTJ 359 (1990) 574, PRL 65 (1990) 1297, PRL 65 (1990) 1301, PL B270 (1991) 89, PRL 66 (1991) 9, JPSJ 60 (1991) 2808, PR D43 (1991) 2843, PR D44 (1991) 617, PR D44 (1991) 2220, PR D44 (1991) 2241 [erratum: PR D45 (1992) 2170], NIM A320 (1992) 310, PL B278 (1992) 217, PL B280 (1992) 146, PL B283 (1992) 446, PL B289 (1992) 463, PR D45 (1992) 3355, NIM A329 (1993) 299, PL B311 (1993) 357, NP (PROC SUPPL) 31 (1993) 105, PR D48 (1993) 5505, NIM A340 (1994) 612, PL B335 (1994) 237, ASTJ 435 (1994) 225, and PL B374 (1996) 238.

Related experiments KEK-261A

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WWW Home-page
http://www-sk.icrr.u-tokyo.ac.jp/doc/kam/index.html

UNDERGROUND-SUPERKAMIOKANDE

(Proposed 1986, Approved 1991, Began data-taking Apr 1996, In progress)

THE SUPER-KAMIOKANDE SOLAR NEUTRINO AND NUCLEON DECAY DETECTOR

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KEK – J Kanzaki, K Nakamura, Y Oyama, M Sakuda, O Sasaki
TOHOKU U – K Fujita, A Hasegawa, T Hasegawa, S Hatakeyama, T Iwamoto, T Kinebuchi, M Koga, T Maruyama, H Ogawa, M Saito, A Suzuki, F Tsushima
TOKAI U, HIRATSUKA – M Eto, M Koshiba, K Nishijima
OSAKA U – A Kusano, Y Nagashima, M Takita, T Yamaguchi
NIIGATA U – T Ishizuka, Y Kitaguchi, H Koga, K Miyano, H Okazawa, M Takahata
TOKYO INST TECH – Y Hayato, Y Kanaya, K Kaneyuki, Y Watanabe
GIFU U – S Tasaka
MIYAGI U OF EDUCATION – M Mori
KOBE U – S Echigo, M Kohama, A T Suzuki
TOKYO U, INS – E Ichihara, T Inagaki, K Nishikawa, A Sakai
BOSTON U – M Earl, E Kearns, S B Kim, M Messier, J L Stone, L R Sulak, K Yoshida
BROOKHAVEN – M Goldhaber
UC, IRVINE – T Barszczak, W Gajewski, P G Halverson, J Hsu, W R Kropp, L R Price, F Reines, H W Sobel
CAL STATE, DOMINGUEZ HILLS – K Ganezer, W Keig
GEORGE MASON U – R W Ellsworth
HAWAII U – J Flanagan, J Learned, S Matsuno, V Stenger
LOS ALAMOS – T J Haines
LOUISIANA STATE U – E Blaufuss, R Sanford, R Svoboda, M R Vagins
MARYLAND U – M L Chen, Z Conner, J A Goodman, G Sullivan
SUNY, STONY BROOK – J Hill, C K Jung, C Mauger, C McGrew, B Viren, C Yanagisawa
WARSAW U – D Kielczewska
WASHINGTON U, SEATTLE – V Chaloupka, J George, A Stachyra, L Wai, J Wilkes, K Young

Accelerator NONE *Detector* SUPER-KAMIOKANDE

Brief description Uses a 50,000-ton ring imaging water Čerenkov detector at a depth of 2700 m of water equivalent (mwe) in the Kamioka Mozumi mine in Japan. The detector consists of

a stainless steel tank in the shape of a right circular cylinder, 39 m diameter and 41 m height, filled with purified water. It is optically segmented into an inner volume, and an outer (anti-coincidence) region. The inner region is viewed by 11,200 photomultiplier tubes (PMT's). The outer annulus is used to tag entering muons as well as to attenuate low-energy γ's and neutrons. The outer region is viewed by 1,800 PMT's. Taking data (July 96).

Related experiments KEK-362

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WWW Home-page http://www-sk.icrr.u-tokyo.ac.jp/

UNDERGROUND-KGF

(Began data-taking Oct 1980, Completed data-taking 1992)

THE KOLAR GOLD FIELD EXPERIMENT

TATA INST – H Adarkar, S R Dugad, S D Kalmani, M R Krishnaswamy, J D Kulkarni, M G K Menon, N K Mondal, P S Murty, P Nagaraj, V S Narasimham (√ Spokesperson), B Satyanarayana, B V Sreekantan
OSAKA CITY U – Y Hayashi, N Ito, S Kawakami, T Mitsuyama, T Nakamura, K Tanaka
KANAGAWA U – S Miyake

Accelerator NONE *Detector* Calorimeter

Particles studied p, n

Brief description Phase-I of the experiment was completed in 1985. The phase-II detector is a 260-ton iron tracking calorimeter with 60 layers of proportional counter tubes, 6600 m of water equivalent underground. A monopole detector has been added in phase-III. Studies nucleon decays and searches for magnetic monopoles and point sources of high-energy ν_μ's. Completed in 1992.

Journal papers PL B106 (1981) 339, PL B115 (1982) 349, PL B142 (1984) 99, NC 9C (1986) 167, NIM A284 (1989) 422, and PL B267 (1991) 138. No further papers expected.

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UNDERGROUND-LVD

(Proposed 1984, Approved Apr 1985, Began data-taking Jun 1992, In progress)

SEARCH FOR STELLAR-COLLAPSE NEUTRINOS WITH THE LARGE VOLUME DETECTOR

LVD COLLABORATION
ASHIKAGA INST TECH – K Saitoh
BOLOGNA U – P Antonioli, G Bari, M Basile, F Bersani, G Bonoli, G Bruni, G Cara Romeo, L Cifarelli, F Cindolo, A Contin, L Emaldi, C Ghetti, P Giusti, F Grianti, G Iacobucci, M L Luvisetto, T Massam, R Nania, A Pesci, G Sartorelli, M Selvi, A Zichichi (√ Spokesperson)
BROWN U – A Bosco, A De Silva, M Widgoff
CAMPINAS U – J A Chincellato, L G Dos Santos, E Kemp, N Mengotti Silva, A Turtelli
FRASCATI – F L Fabbri, G Maccarrone, L Votano
GRAN SASSO & INFN, ASSERGI – N Taborgna
HOUSTON U – K Lau, B Mayes, L Pinsky, J Pyrlik, R Weinstein
INDIANA U – E D Alyea
MIT, LNS – M Deutsch, E S Hafen, P Haridas, I A Pless, J Tang
NORTHEASTERN U – J Moromisato, E Von Goeler
MOSCOW, INR – V S Berezinsky, V L Dadykin, R I Enikeev, F F Khalchukov, E V Korolkova, P V Kortchaguin, V B Kortchaguin, V A Kudryavtsev, A S Malguin, V G Ryasny, O G Ryazhskaya, V P Talochkin, V F Yakushev, G T Zatsepin
OKAYAMA U – S Tsuji, T Wada
OKAYAMA UNIV SCI – I Yamamoto
PERUGIA U & INFN, PERUGIA – B Alpat, I Uman
SAITAMA U – N Inoue
TURIN, COSMO-GEOFISICA LAB & TURIN U & INFN, TURIN – C Aglietta, G Badino, M Bertaina, R Bertoni, C Castagnoli, A Castellina, A Chiavassa, W Fulgione, P Galeotti, P Ghia, R Granella, C Melagrana, C Morello, G Navarra, L Panaro, L Periale, P Picchi, O Saavedra, G C Trinchero, P Vallania, S Vernetto, C Vigorito
URBINO U & INFN, FLORENCE – G Conforto, P Dominici, G Guidi, R Mantovani, A Megna, S Santini, F Vetrano

Accelerator NONE *Detector* Scintillator, Streamer chamber

Reactions

$\overline{\nu}_e\ p \to e^+\ n$	—
$\nu\ C \to \nu\ C\ \gamma$	—
$\overline{\nu}\ C \to \overline{\nu}\ C\ \gamma$	—
$\nu\ e^- \to \nu\ e^-$	—
$\nu_e\ C \to e^-$ Nit	—
$\overline{\nu}_e\ C \to e^+$ Bor	—

Particles studied p, n, muon, ν

Brief description The experiment is located in the Gran Sasso Laboratory at a minimum depth of about 3300 mwe. The apparatus consists of a streamer tube tracking system interleaved with a large volume of liquid scintillator and its support structure which acts as a passive absorber. It is a high precision tracking calorimeter with the major part of its volume sensitive, and with the sensitive elements uniformly distributed. Of the five towers which will constitute the complete LVD, the first one is operational since June 92 and the second one since June 94. The main features of an LVD tower are: surface area 660 m^2, geometrical acceptance 1768 m^2 sr, and liquid scintillator mass 368 tons. The major purpose of the experiment is to search for neutrinos from stellar collapses in our galaxy. Other physics goals include: measurement of the atmospheric neutrino flux and search for neutrino oscillations, study of the spectrum and interactions of cosmic ray muons and muon bundles, and investigation of events detected in time coincidence with the EASTOP experiment at the surface of the mountain. Taking data (July 96).

Journal papers NC C9 (1986) 237, NIM A264 (1988) 5, NIM A274 (1989) 177, NIM A277 (1989) 11, NIM A277 (1989) 17, NIM A295 (1990) 466, NC 105A (1992) 1793, NC 105A (1992) 1815, NIM A329 (1993) 521, NP (PROC SUPPL) 31 (1993) 450, NP (PROC SUPPL) 35 (1994) 240, NP (PROC SUPPL) 35 (1994) 243, NP (PROC SUPPL) 35 (1994) 259, NP (PROC SUPPL) 35 (1994) 267, ASPP 2 (1994) 103, ASPP 3 (1995) 311, and NC 18C (1995) 628.

Related experiments MACRO, KAMIOKANDE, SUPERKAMIOKANDE

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UNDERGROUND-MACRO

(Proposed 1984, Approved Apr 1985, Began data-taking Feb 1989, In progress)

MONOPOLE, ASTROPHYSICS, AND COSMIC RAYS OBSERVATORY

MACRO COLLABORATION
BARI U & INFN, BARI – R Bellotti, F Cafagna, M Calicchio, M Castellano, L De Benedictis, G De Cataldo, C De Marzo, O Erriquez, C Favuzzi, P Fusco, N Giglietto, P Guarnaccia, M N Mazziotta, T Montaruli, A Raino, P Spinelli
BOLOGNA U & INFN, BOLOGNA – S Cecchini, H Dekhissi, R Fantini, G Giacomelli (√ Spokesperson), F Maaroufi, G Mandrioli, S Manzoor, A Margiotta-Neri, L Patrizii, V Popa, P Serra-Lugaresi, M Spurio, V Togo
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CAL TECH – B C Barish (√ Spokesperson), E Katsavounidis, S Kyriazopoulou, N Longley, D G Michael, R Nolty, C W Peck, K Scholberg, C W Walter
DREXEL U – C Lane, R Steinberg
FRASCATI – G Battistoni, H Bilokon, C Bloise, M Carboni, V Chiarella, C Forti, E Iarocci, A Marini, V Patera, F Ronga, L Satta, A Sciubba, M Spinetti
GRAN SASSO – R Antolini, A Di Credico, A Grillo, C Gustavino, S Mikheyev, S Parlati, J Reynoldson, E Scapparone
INDIANA U – C Bower, A Habig, A Hawthorne, R Heinz, L Miller, S Mufson, J Musser

AQUILA U – I De Mitri, P Monacelli
LECCE U & INFN, LECCE – P Bernardini, G Mancarella, D Martello, O Palamara, S Petrera, P Pistilli, A Surdo
MICHIGAN U – R Baker, S Coutu, K Hanson, D Levin, M Longo, G Tarle
NAPLES U, IFS & INFN, NAPLES – M Ambrosio, G C Barbarino, D Campana, F Guarino, G Osteria, U Rubizzo
PISA U & INFN, PISA – A Baldini, C Bemporad, F Cei, G Giannini, M Grassi, D Nicolo, R Pazzi
ROME U – G Auriemma, S Bussino, M De Vincenzi, E Lamanna, P Lipari, C Satriano, M Severi
TEXAS A AND M – A Sanzgiri, R Webb
TURIN U & INFN, TURIN – V Bisi, A Marzari-Chiesa, M Monteno, M Sitta

Accelerator NONE *Detector* MACRO

Particles studied monopole, muon, ν

Brief description The MACRO detector has been primarily designed to conduct a search for supermassive grand unified magnetic monopoles. It is a general purpose detector, which is also searching for nuclearites, WIMP's, fractional charge particles, $\overline{\nu_e}$ from stellar gravitational collapses, high-energy ν_μ's from cosmic sources, *etc.* It is studying high-energy cosmic ray muons (vertical intensity, seasonal variation, moon shadow, anisotropy, possible muon astronomy), cosmic ray composition at high energies, atmospheric neutrinos, *etc.* Operates in coincidence with an air shower array (EASTOP) to study the primary cosmic ray composition at high energies. The detector has six supermodules in two levels, each instrumented to operate independently of the others. Each lower supermodule consists of a horizontal array of two layers of liquid scintillation counters, ten layers of limited streamer tubes, one layer of CR39 nuclear track detectors and seven layers of absorbers. The upper part (Attico) has four horizontal layers of streamer tubes and one layer of scintillators. The sides are covered with one layer of scintillators and 6 layers of streamer tubes. The CR39 detector is also mounted on the east vertical side and on the north lower side. The global dimensions are $12\times76\times9$ m^3 and it contains 600 tons of liquid scintillator. The detector is located in Hall B of the Gran Sasso Laboratory. Has an overhead shielding of about 3800 m of water equivalent. Taking data in its full configuration (July 96).

Journal papers NC 9C (1986) 281, NIM A281 (1989) 213, PR D42 (1990) 1396, PL B249 (1990) 149, NIM A300 (1991) 581, NIM A301 (1991) 275, NP (PROC SUPPL) 24B (1991) 191, NIM A321 (1992) 609, PRL 69 (1992) 1860, ASPP 1 (1992) 11, PR D46 (1992) 895, PR D46 (1992) 4836, NP B370 (1992) 432, NIM A324 (1993) 337, ASTJ 412 (1993) 30, PL B337 (1994) 376, PRL 72 (1994) 608, PRL 73 (1994) 1306, PR D50 (1994) 3046, PL B357(1995) 481, ASPP 4 (1995) 33, and PR D52(1995) 3793.

Related experiments CERN-WA-086, CERN-EMU-018

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WWW Home-page http://rsgs02.lngs.infn.it/macro/macro.html

UNDERGROUND-SAGE

(Proposed 1964, 1984, Approved 1985, Began data-taking May 1988, In progress)

THE RUSSIAN-AMERICAN GALLIUM SOLAR NEUTRINO EXPERIMENT (SAGE)

SAGE COLLABORATION
MOSCOW, INR – J N Abdurashitov, V N Gavrin (√ Spokesperson), S V Girin, V V Gorbatchev, T V Ibragimova, A V Kalikhov, N G Khairnasov, T V Knodel, I N Mirmov, A A Shikhin, E P Veretenkin, V M Vermul, V E Yants, G T Zatsepin
LOS ALAMOS – T J Bowles (√ Spokesperson), J S Nico, W A Teasdale, D L Wark
WASHINGTON U, SEATTLE – S R Elliott, J F Wilkerson
PENN U – B T Cleveland, T Daily, R Davis, K Lande, C K Lee, P W Wildenhain
LOUISIANA STATE U – M L Cherry

Accelerator NONE *Detector* GGNT

Reactions
$\nu_e\ ^{71}\mathrm{Ga} \rightarrow e^-\ ^{71}\mathrm{Ge}$ —

Particles studied ν_e

Brief description Uses the Gallium-Germanium Neutrino Telescope (GGNT) situated in an underground laboratory built in the Baksan Neutrino Observatory, Northern Caucasus, Russia. Has an overhead shielding of about 4700 m of water equivalent. Sensitive to the low energy neutrinos produced by the *pp* fusion in the Sun. Exploits the radiochemical procedure and uses liquid metallic gallium (30 tons in the first stage, 57 tons in 1991). A purification procedure, implemented beginning with the January 90 extraction, resulted in a significant background reduction. The SAGE-II phase began in September 92. Counts the K and L peaks in ^{71}Ge decay, with 57 tons of Ga and low background. A calibration with a ^{51}Cr artificial neutrino source of about 0.5 mC activity was carried out in 1995. Taking data (July 96).

Journal papers PRL 67 (1991) 3332, and PL B328 (1994) 234.

Related experiments GALLEX, BOREXINO

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UNDERGROUND-SOUDAN-2

(Proposed 1981, Approved 1983, Began data-taking 1988, In progress)

THE SOUDAN-2 PROTON DECAY EXPERIMENT

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Accelerator NONE *Detector* Calorimeter

Particles studied p, n, ν_e, ν_μ

Brief description A 960-ton iron tracking calorimeter uses drift projection tubes arranged in a hexagonal array. The tubes are 15 mm in diameter separated by 1.6 mm of steel. Trigger thresholds are 100 MeV kinetic energy for muons and 150 MeV for electrons. The main detector is completely surrounded by a 1700 m^2 active shield of proportional tubes which identifies events associated with cosmic ray muons. A charged particle test-beam calibration of the 4.3-ton calorimeter modules has been completed. A surface array and an air Čerenkov detector are operated in coincidence with the SOUDAN-2 detector to provide information about the air showers which produce underground muons. The experiment is located in the Soudan mine, Minnesota, 2090 m of water equivalent underground. The data taking began in mid-1988 when 275 tons of the detector were installed. The detector was completed in late 1993. Physics topics include studies of nucleon decay, atmospheric neutrinos and neutrino oscillations, cosmic ray composition, and searches for magnetic monopoles and point sources of cosmic rays. Taking data (July 96). The collaboration has also proposed the use of the SOUDAN-2 detector for a long baseline neutrino oscillation experiment MINOS (see FNAL-875).

Journal papers NIM A276 (1989) 371, NIM A283 (1989) 642, PR D42 (1990) 2967, JPHY G17 (1991) S393, PL B269 (1991) 220, NP (PROC SUPPL) 28A (1992) 377, PR D46 (1992) 4846, PR D52 (1995) 2760, and NIM A376 (1996) 36.

Related experiments FNAL-822, FNAL-875

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WWW Home-page http://hepwww.rl.ac.uk/soudan2/index.html

UNDERGROUND-SUDBURY

(Proposed 1985, Approved 1990, In preparation)

THE SUDBURY NEUTRINO OBSERVATORY (SNO)

SNO COLLABORATION
QUEENS U, KINGSTON – E P Bonvin, L Erhardt, H C Evans, G T Ewan (√ Spokesperson), R J Ford, A L Hallin, A Hamer, C J Jillings, H W Lee, J R Leslie, J D MacArthur, H B Mak, A B McDonald (√ Spokesperson), W McLatchie, B Moffat, T J Radcliffe, B C Robertson, P Skensved, R L Stevenson
CHALK RIVER, AECL – E D Earle, J D Hepburn, G Jonkmans, B Sur
CRPP, OTTAWA – W F Davidson, F Delnoki-Varess, C K Hargrove, K McFarlane, T Noble, V M Novikov, M O'Neill, M Shatkay, D Sinclair
GUELPH U – T Anderson, M C Chon, P Jagam, J Law, R Ollerhead, J J Simpson, J X Wang
LAURENTIAN U – J Bigu, E D Hallman, R U Haq, J G Hykaway, A Roberge, E Saettler, C J Virtue
BRITISH COLUMBIA U – R Helmer, R Komar, A Poon, C Waltham
PENN U – E W Beier (√ Spokesperson), D Cowen, W Frati, J R Klein, D McDonald, F M Newcomer, R Van de Water, R Van Berg, J Wang, P Wittich
LOS ALAMOS – T J Bowles, S J Brice, M M Fowler, A Goldschmidt, A Hime, P Thornewell, J B Wilhelmy, J M Wouters
LBL – Y D Chan, M P Isaac, K T Lesko, M E Moorhead, E B Norman, A R Smith, R G Stokstad
WASHINGTON U, SEATTLE – Q R Ahmad, J Beck, M C Browne, P J Doe, C Duba, S R Elliott, J V Germani, R Meijer-Drees, R G H Robertson, T D Steiger, J F Wilkerson
OXFORD U – J C Barton, S Biller, M G Bowler, X Chen, G Doucas, H D Heron, N A Jelley (√ Spokesperson), A B Knox, W J Locke, J J Lyon, N W Tanner (√ Spokesperson), R K Taplin, M D Thorman, P T Trent, D L Wark, N West
BROOKHAVEN – J Boger, R L Hahn, J K Rowley

Accelerator NONE *Detector* Counter

Reactions

$\nu\, e^- \rightarrow \nu\, e^-$	—
ν_e deut $\rightarrow p\, p\, e^-$	—
ν deut $\rightarrow p\, n\, \nu$	—
$\overline{\nu}_e$ deut $\rightarrow n\, n\, e^+$	—
$\overline{\nu}_e\, p \rightarrow n\, e^+$	—

Particles studied ν

Brief description The detector is a 1000-ton heavy water (D_2O) Čerenkov detector designed to study neutrinos from the Sun and other astrophysical sources. The use of heavy water allows both electron neutrinos and all other types of neutrinos to be observed by three complementary reactions. The detector will be sensitive to the ν_e flux and energy spectrum shape and to the total neutrino flux irrespective of neutrino type. These measurements will provide information on both vacuum neutrino oscillations and matter-enhanced oscillations, the MSW effect. In the event of a supernova it will be very sensitive to ν_μ and ν_τ as well as the ν_e's emitted in the initial burst, enabling sensitive mass measurements as well as providing details of the physics of stellar collapse. The underground cavity is complete and equipment is being installed. The detector is scheduled to be filled with heavy water in Spring 1997. In preparation (July 96).

Journal papers NC 9C (1986) 308, PL B194 (1987) 321, NIM A314 (1992) 373, and NIM A370 (1996) 579.

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UNDERICE-AMANDA

(In preparation)

ANTARCTIC MUON AND NEUTRINO DETECTOR: AMANDA

AMANDA COLLABORATION
UC, BERKELEY – D Lowder, T Miller, P B Price, A Richards
LBL – D Nygren
UC, IRVINE – S Barwick (√ Spokesperson), P C Mock, R Porrata, E Schneider, G Yodh
WISCONSIN U – A Coulthard, K Engel, L Gray, F Halzen (√ Spokesperson), J Jacobsen, V Kandhadai, I Liubarsky, R Morse, J C Spang, S Tilav
STOCKHOLM U – P Askebjer, L Bergstrom, A Bouchta, E Dahlberg, B Erlandsson, A Goobar, P O Hulth, S Johansson, Q Sun, C Walck
UPPSALA U – S Carius, A Hallgren, H Rubinstein
DESY-IFH, ZEUTHEN – H Heukenkamp, S Hundertmark, A Karle, C Spiering, O Streicher, T Thon, R Wischnewski
BARTOL RESEARCH INST – T C Miller

Accelerator NONE *Detector* PMT

Particles studied ν

Brief description AMANDA is a high-energy neutrino observatory which uses the deep South Pole ice as a target and a track-sensitive, transparent detecting medium. Upward moving neutrinos, having passed through the Earth, interact with ice and produce muons. The muons generate Čerenkov radiation which can be recorded by photomultiplier tubes (PMT). The tubes are placed in vertical shafts melted into the icecap to the depth of 1720 m. The data acquisition is handled in a counting facility at the surface. As of July 96, a total of 173 operating PMTs has been installed. The plan is to have at least 800 optical modules operating before the end of the century. Under construction (July 96).

Journal papers NATU 353 (1991) 807, and SCI 267 (1995) 1147.

Related experiments BAIKAL, DUMAND, NESTOR

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WWW Home-page http://dilbert.lbl.gov/www/amanda.html

UNDERWATER-BAIKAL

(Proposed 1984, Approved Jan 1987, Nov 1992, Began data-taking 1993, In progress)

THE LAKE BAIKAL DEEP UNDERWATER NEUTRINO TELESCOPE, NT-200

BAIKAL COLLABORATION
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IRKUTSK STATE U – N M Budnev, A G Chensky, V I Dobrynin, O N Gaponenko, T A Gress, A P Koshechkin, R R Mirgazov, A V Moroz, S A Nikiforov, Y V Parfenov, A A Pavlov, K A Pocheikin, P A Pokolev, V Y Rubzov, S I Sinegovsky, V A Tarashansky
MOSCOW STATE U – S B Ignat'ev, L A Kuzmichev, N I Moseiko, E A Osipova
NIZHNII NOVGOROD STATE U – S V Fialkovsky, V F Kulepov, M B Milenin
ST PETERSBURG, MARINE TECH U – M I Rozanov
KURCHATOV INST, MOSCOW – A I Klimov
DUBNA – I A Belolaptikov
DESY, ZEUTHEN – A Karle, T Mikolajski, D Pandel, C Spiering, O Streicher, T Thon, C Wiebusch, R Wischnewski

Accelerator NONE *Detector* Counter

Particles studied ν, muon, monopole

Brief description The deep-underwater Čerenkov detector NT-200, effective area of about 2000 m^2, will consist of 192 optical

modules arranged on 8 strings at 1100 m depth. The modules are equipped with 37-cm QUASAR phototubes. The experiment studies muons generated in neutrino interactions or in reactions of primary cosmic rays in the atmosphere, and searches for GUT magnetic monopoles. Measures the neutrino flux from the Earth atmosphere, searches for neutrinos from cosmic sources and from WIMP annihilations in the center of the Earth. A part of the detector consisting of 36 optical modules has operated in 1993/94. A 72-module version took data from Apr 95 to Mar 96, and the 96-module detector (half of the NT-200) began taking data in Apr 96.

Journal papers NP (PROC SUPPL) 14B (1990) 51, NP (PROC SUPPL) 19 (1991) 388, YF 52 (1990) 86 = SJNP 52 (1990) 54, NP (PROC SUPPL) 28B (1992) 491, NP (PROC SUPPL) 35 (1994) 290, NP (PROC SUPPL) 35 (1994) 301, NP (PROC SUPPL) 43 (1995) 241, and NP (PROC SUPPL) 48 (1995) 463.

Related experiments AMANDA, DUMAND, NESTOR

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UNDERWATER-DUMAND

(Proposed 1988, Approved 1990, In preparation)

DEEP UNDERWATER MUON AND NEUTRINO TELESCOPE

DUMAND-II COLLABORATION

AACHEN, TECH HOCHSCH, III PHYS INST – P Bosetti, D Samm, C Wiebusch
BERN U – P K F Grieder, P Minkowski, E Torrente-Lujan
BOSTON U – S T Dye, E Hazen, A Mavretic
UC, BERKELEY – H Crawford, C Kuo, G Shapiro, L Stevenson
UC, SAN DIEGO – H Bradner
HAWAII U – J Bolesta, P W Gorham, S Kondo, J G Learned (√ Spokesperson), S Matsuno, M Mignard, R Mitiguy, D O'Connor, S Olsen, V Z Peterson, A Roberts, M Rosen, V J Stenger, D Takemori, G Wilkins
IOWA STATE U – E W Anderson, J M Hauptman, K Mauritz
KIEL U – T Knutz, P Koske
KOBE U – K Kobayakawa
KINKI U, IIZUKA – T Kitamura
LOUISIANA STATE U – R Clark, R Svoboda, M Vagins
OKAYAMA UNIV SCI – I Yamamoto
SCRIPPS INST OCEANOGRAPHY – H Bradner
TOHOKU U – H Hanada, T Hayashino, M Ito, Y Kawamorita, H Kawamoto, T Matsumoto, T Takayama, S Tanaka, A Yamaguchi
TOKYO U, ICRR – T Aoki, K Mitsui, Y Ohashi, A Okada
KEK – M Fukawa, M Sakuda, S Uehara
VANDERBILT U – K Miller, M Webster
WASHINGTON U, SEATTLE – H Berns, P Boynton, V Chaloupka, B Egaas, J George, J J Lord, R J Wilkes, K Young
WISCONSIN U – U Camerini, W Grogan, M Jaworski, R March, T Narita, D Nicklaus

Accelerator NONE *Detector* Counter

Particles studied muon, ν, monopole

Brief description In the first stage of the experiment (DUMAND-I), a test of the operation of 7 phototube modules was carried out. Measurements were made with a vertical string of modules suspended from a ship. Phase-II was approved in 1990. The plans called for an octagonal 9-string array, 24 tubes per string, to be built by 1995. The array called DUMAND-II was to be located at a depth of 4760 m, 25 km off the coast of the Hawaiian Islands. For more details see the DUMAND-II proposal (U. of Hawaii report, HDC-1-88). The aim of the experiment is to build a system capable of searching for point sources of high-energy neutrinos of astrophysical origin, and very-high-energy cosmic ray muons. Other systems to be studied include WIMP's, quark nuggets, and monopoles. The detector is a 2-megaton Čerenkov counter, with a muon area of 20,000 m^2, and an angular resolution of 1°. Initial installation took place in December 93, and proof data was acquired. As of June 94, three strings are ready to be installed. However, a SAGENAP report of June 96 recommends cancellation of funding for the project, despite endorsement of its goals and feasibility. Other sources of support are being sought (July 96).

Journal papers NIM A276 (1989) 359, and PR D42 (1990) 3613.

Related experiments BAIKAL, AMANDA, NESTOR

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WWW Home-page http://web.phys.washington.edu /local_web/dumand/aaa_dumand_home.html

UNDERWATER-NESTOR

(In preparation)

NESTOR: A NEUTRINO PARTICLE ASTROPHYSICS UNDERWATER LABORATORY FOR THE MEDITERRANEAN

NESTOR COLLABORATION

Accelerator NONE *Detector* Counter

Particles studied ν

Brief description NESTOR is a detector for underwater neutrino astrophysics. It is located in the international waters off the southwest coast of Greece. The first phase of the project calls for the construction and deployment of a hexagonal tower with 168 optical modules and an effective area of 20,000 m^2 suitable for the detection of TeV neutrinos. When completed, the full NESTOR array will have six additional towers in a hexagonal configuration, providing a sensitive area bigger than 100,000 m^2 for 1 TeV neutrinos, and an overall angular resolution better than 1°. The first tower is under construction and is expected to be deployed in 1997. For further information about the project please contact the Spokesperson, Prof. Leonidas K. Resvanis [Athens U.]

Related experiments BAIKAL, DUMAND, AMANDA

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