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UNIVERSITY OF
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Radiation Laboratory

BERKELEY, CALIFORNIA

SUMMARY - BEVATRON RESEARCH MEETING II
October 13, 1953
4 PM Auditorium, Bldg. 50

Owen Chamberlain; Cosmotron

General Performance Characteristics

The operational characteristics of the Cosmotron were reviewed in brief. Since a rather complete account of this machine is now available in the September 1953 issue of Rev. Sci. Inst., this summary will include only the more recent utilization of the machine as a research instrument.

Ejected Beams

Two π^- meson beams and one neutron beam are currently available from the east straight section. The 1.5 Bev π^- beam is momentum analyzed by the C-magnet yoke and proceeds to the experimental area via a bending magnet. A second π^- beam is separated into 300 Mev and 1.1 Bev particles with a 5-inch gap bending magnet.

The beam intensity from pulse to pulse exhibits unpredictable fluctuations. A sharp upper limit in beam intensity is found. Perhaps 50 percent of the beam pulses are within a few percent of maximum intensity, whereas 10 percent of the pulses are at 10 percent intensity.

The time dependence of the beam pulse may be controlled to some extent by the choice of beam ejection. If the r-f is kept on so that the beam is driven into a target, short pulses of 30 millimicroseconds duration occur approximately every 250 millimicroseconds. Turning off the r-f abruptly and allowing the magnetic field to spiral the beam into an internal target produces a single square beam pulse of approximately 1 millisecond duration. This technique is usually used for cloud chamber work. If the r-f level is allowed to taper off slowly many long unsymmetrical beam pulses are obtained. The π^- intensity versus energy spectrum exhibits an increase in the number of mesons with a decrease in energy.

Targets

Fixed internal radius targets as well as actuated external radius targets have been used with success. In general, the air-ram driven external targets are used when photographic plates are to be exposed.

A radial lip target (similar to one developed independently by Warren Chupp at this laboratory) has been used with success. The extended lip causes sufficient energy loss in the beam pulse to excite large radial oscillations which bring the beam into the main target mass on the succeeding turn.

Meson Total Cross-Section Measurements

Preliminary work has started on total cross-section measurements for π^- mesons in the Bev range. The experimental setup includes quad. coincidence counters placed two before and two after the bending magnet. CH_2 and C absorbers are being used with large area counters.

Events

Several V-particle events have now been observed. One track photograph showed a 1.5 Bev π^- which produced a V_1^0 and V_4^0 which then decayed with characteristic Q values of 30 Mev and 250 Mev respectively.