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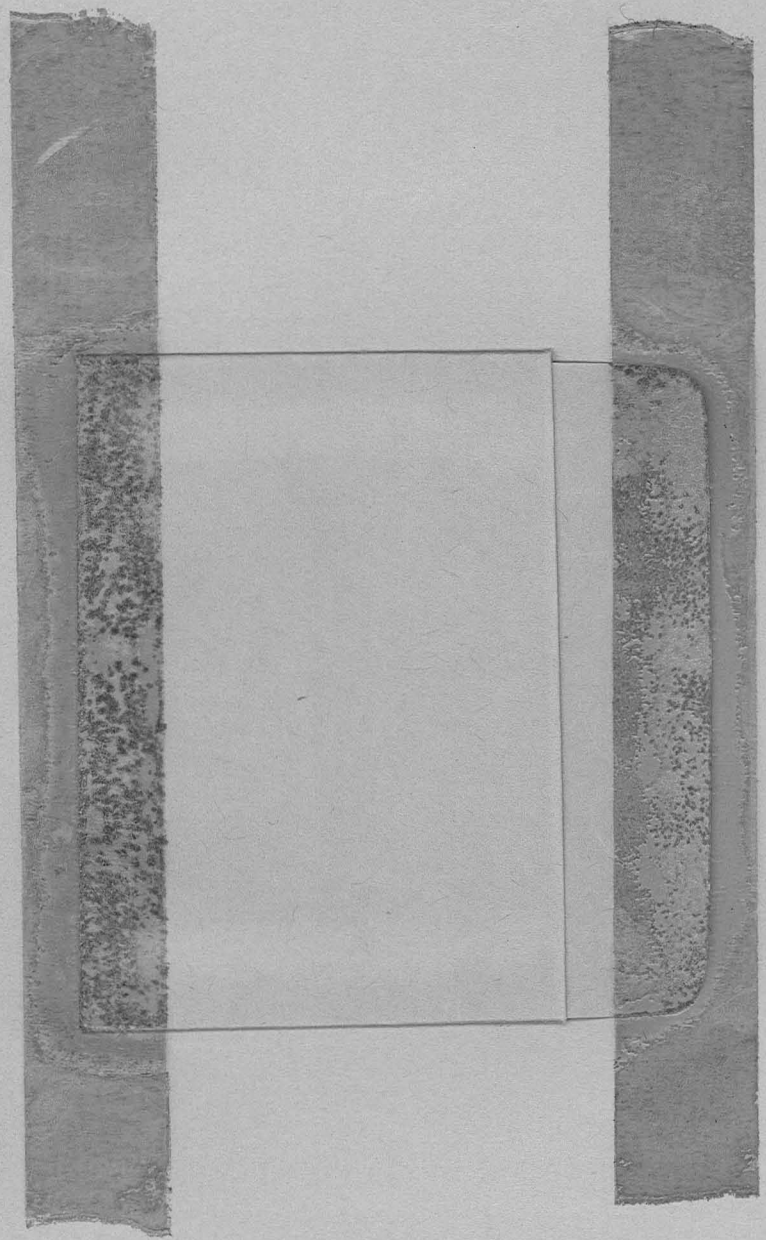

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UNIVERSITY OF CALIFORNIA

RADIATION LABORATORY

Contract No. W-7405-Eng-48

SUMMARY OF RESEARCH PROGRESS MEETING

Inez C. O'Brien

November 6, 1947

Berkeley, California

SUMMARY OF RESEARCH PROGRESS MEETING

November 6, 1947

by Inez C. O'Brien

Contract No. W-7405-Eng-48

RESEARCH PROGRAM AT BIRMINGHAM, ENGLAND.

Synchrotron. J. S. Goodin

A 1,000 Mev synchrotron is under construction. The magnet will be a ring magnet containing about 900 tons of steel. The plates are of 1.2 inch steel with a 0.1 percent carbon content. A diagram of the cross section of this magnet is given in Figure 1.

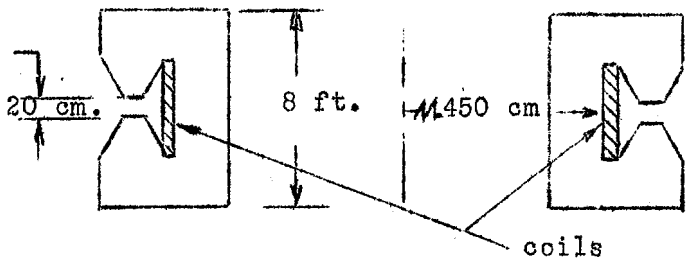

FIG. 1

The design of the vacuum chamber presents some difficulties since the space behind the gap is not large enough to permit easy access to the windings and to the vacuum space behind the gap. The field strength at the gap is 15,000 gauss with a 1 sec. rise time. A d.c. generator of 1,000 v and 10,000 amps and a flywheel will be used to energize the magnet and store the energy.

Plans for the vacuum system are not complete, but probably a porcelain system will be used. This will reduce the gap quite considerably.

It is planned to inject at 3,000 volts. The energy added to be about 200 ev per revolution. The frequency range is 250 kc/sec to 10 mc/sec; the power required is 10 Kw.

A diagrammatic view of the electrical arrangement of the r.f. system is given below:

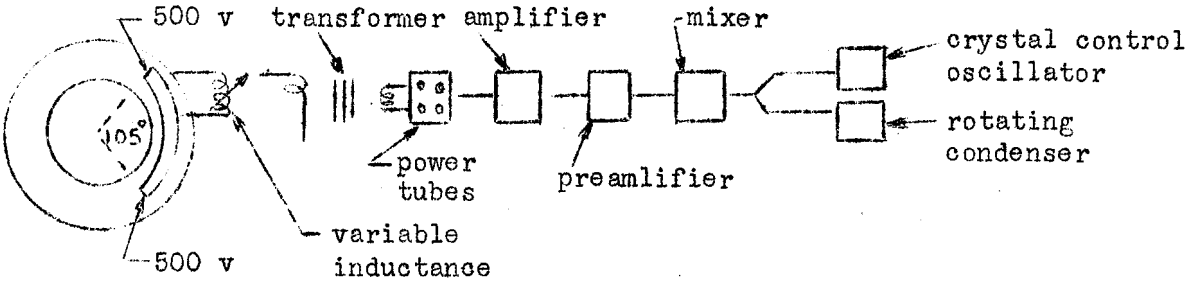

FIG. 2

The variable inductance is a coil tipped at variable pitch into a pool of mercury. The energy is supplied by four 3J160E tubes.

The frequency must be accurate to 0.1 percent at the time of injection and after that 1 percent is sufficient. This is to be accomplished by means of a peaking coil in the field. The injection period is 100 micro-seconds. It is planned to use a 0.5 Mev d.c. Phillips' set to supply the injection voltage.

Cyclotron. J. H. Fremlin

The cyclotron has a 72 inch magnet tapering to 66 inches with a gap of about 20 in. Cooling plates will reduce the gap to 10 in. The frequency is fixed for accelerating deuterons. The field strength is 15,500 gauss and 26 Mev deuterons are removed at a radius of 27 in. The threshold voltage between the dees is 200 Kw. A 150 Kw generator will be used which should be capable of producing about 400 Kw between the dees.

A synchrocyclotron for accelerating protons is under design using the same magnet. The dee depth will be cut to 3 in. for this, and the magnet gap cut to 5 1/2 in. For n = 1, the exit radius will be 31 1/2 - 32 in. However, it may be that the value n = 2 will have to be used. It is planned to use a rotating condenser with 9 to 11 inconel metal teeth in the position shown below:

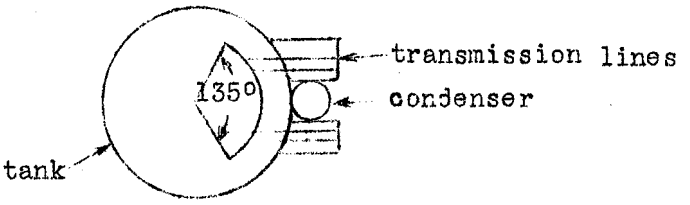

FIG. 3

Measuring Nuclear Cross Sections. N. Knable

Two bismuth fission chambers designed by Kelly and Wiegand were used as detectors. These chambers consist of a 16 in. cyclinder inside of which are placed Al discs. Alternate discs are coated with 10 mg/cm^2 of Bi, and voltage is applied across the other Al discs. The chamber acts as an ionization chamber and is capable of detecting fast neutrons above a threshold of 50 Mev.

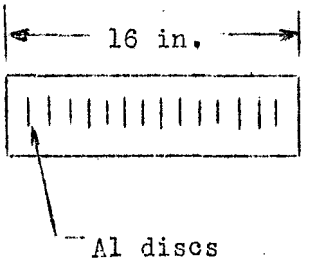

FIG. 4

The following arrangement was used in this experiment:

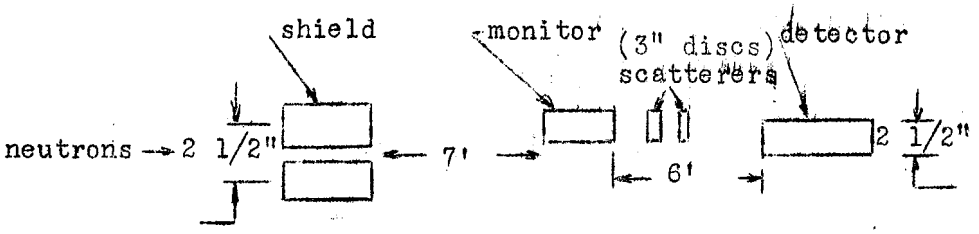

FIG. 5

A low counting rate was used to avoid counts caused by the fragments of stars produced in the chamber and the data corrected for neutrons scattered into the chamber. The following data were obtained:

Element	Cross section in barns	Probable error in %	E. McMillan's data from previous work
Al	.959	3	
Sn	3.2	3	
O	.660	5	
H	.079*	18	.083
C	.450	3	.550
Cu	1.89	3	2.17

*This value was obtained by determining the cross section of paraffin, analyzing the paraffin chemically for H content and then calculating its cross section.