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SUMMARY OF RESEARCH PROGESS MEETING OF OCTOBER 4, 1951

Sergey Shewchuck

November 30, 1951

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Berkeley, California

SUMMARY OF RESEARCH PROGRESS MEETING OF OCTOBER 4, 1951

By S. Shewchuck

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November 30, 1951

I. Oscillator Problems at Argonne 60-in. Cyclotron. By W. W. Salisbury.

The oscillator of the 60 inch cyclotron is now in operation at Argonne though there has been some difficulty in getting it started. The dee system was patterned after the one made for the M.I.T. cyclotron which has been very satisfactory. Brookhaven results had led to the conclusion that a closely coupled self excited oscillator is difficult to get started. It was decided to use a method of separately exciting the oscillator system which has worked well. Four tubes, type ML 354, are used, connected in grounded grid arrangement. The grid filament is driven by two type 880 tubes. There is very little interaction back to the oscillator from the dee system. The area of the coupling loop is small and its impedance is low. The system is easy to keep in tune. The input is capable of 40 amp at 10 kv.

The first difficulty encountered was that the amplifier tubes wouldn't draw any grid current. The connection to the coupling loop had a considerable area so that the impedance of its inductance was nearly equal to that of the loop with the phase 180° off. It was easily corrected when the cause was discovered.

The second difficulty was the unbalance between the two 880 tubes. It appeared that the anodes were boiling indicating possible water leakage in the jacket. The difficulty was traced to the fact that the new water jacket didn't have any r.f. coupling with the anode.

A great deal of care was taken with the vacuum system. A pressure of 2.5×10^{-6} mm could be measured before any outgassing. This contributed greatly toward good dee voltage.

The dee voltage was measured by means of vacuum voltmeters and polystyrene condensers; and, a steady peak voltage was obtained of 380 kv from dee to dee. In the half day trial, sparks occurred about once per minute at this peak voltage. However, if the sparking continues to clear up, as is quite likely, then the voltage may even go higher.

The power capacity of the dee system at peak voltage was computed to be 86 kw. The direct current input to the oscillators and the amplifier combined is 15.5 amp at 8 kv. Hence, the type ML 354 tubes, which are rated at 12 kv and 12.5 amp, will be operated at a reasonable load.

The cyclotron is designed for 22 Mev deuterons and should produce large beams with 200 kv dee voltage. However, it may be possible to get 25 or 26 Mev deuterons. With the Brookhaven cyclotron one can get 1 milliamp with 180 kv dee voltage, the highest dee voltage used in a cyclotron thus far.

The dees are made as one piece from 1/4 in. copper tubing 12 in. in diameter. The ends have been carefully rounded and shaped so as to form a compact housing unit, in this way avoiding expansion problems when separate copper pieces are used. See Fig. 1. The system is very stable and of a very high Q value. Without ion load the value for Q is 14000, which is near the theoretical value.

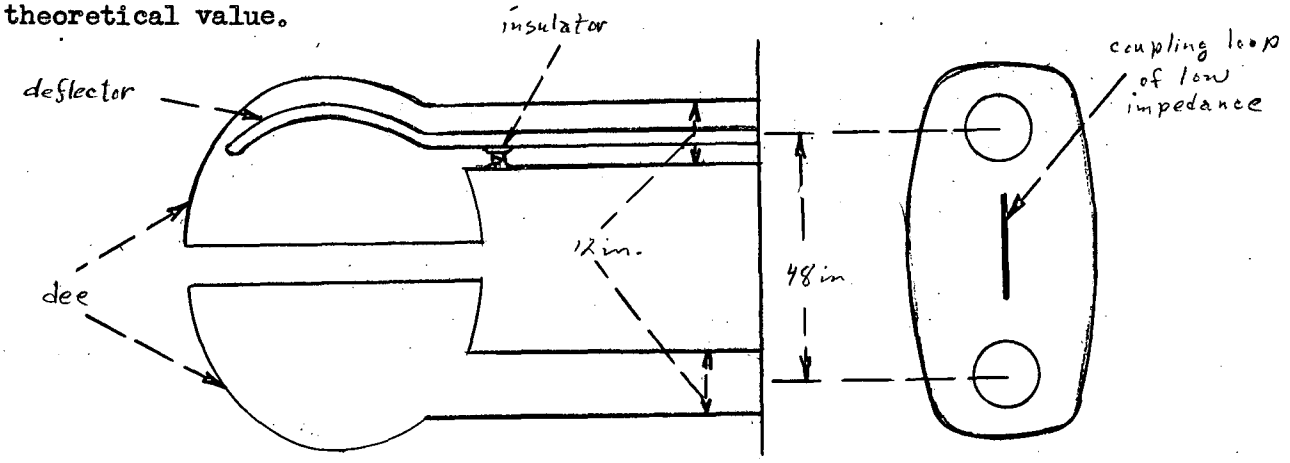

Fig. 1

II. Decay Chain Nd^{140}, Pr^{140}, Ce^{140}. By C. I. Browne.

The speaker based this talk on a report submitted earlier written in collaboration with his colleagues. The report is "The Decay Series Nd^{140} - Pr^{140} - Ce^{140}", UCRL-1469, September 5, 1951, by Charles I. Browne, John O. Rasmussen, Joseph P. Surls, and Donald F. Martin.

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