SESSION III. RADIO FREQUENCY SYSTEMS

J. R. Richardson, Chairman

SUMMARY

K. R. MacKenzie of UCLA discussed the general question of the location, size, and orientation of the accelerating electrodes in the magnet gap. He pointed out that the only practical arrangement for large cyclotrons was the narrow gap design with the accelerating electrodes confined to the valleys. For intermediate energy cyclotrons the advantages of this design lie in lower cost and in lower r-f power and stored energy, with resulting lower wear and tear on the system.

One of the points about the r-f systems about which there was some difference of opinion, as well as differences of approach, was the method of obtaining variable frequency. W. R. Smythe of the University of Colorado reported plans on using a one-dee resonant line system with moving shorting bar. Fine frequency variations would be obtained by means of a variable capacitor. A frequency range of 3:1 is planned. Keith Boyer of Los Alamos pointed out the usefulness of an additional stub line in extending the range of frequency variation. The oscillator of a small variable-energy cyclotron reported by H. W. Fulbright of the University of Rochester is also connected to a resonant line with a remotely controlled shorting bar of interesting design.

R. E. Worsham reported that ORNL may also end up with movable shorts on resonant lines although in this case these may be two 90° dees with a frequency range of 7.5 to 22.5 megacycles, and the resonant lines would come out in opposite directions. Previous work that they had done, using a coupled resonant circuit to get the frequency variation, required much too high r-f voltages on parts of the circuit other than the dees.

B. H. Smith from LRL reported on a scheme which makes use of the change in volume (inductance) to obtain the change in frequency. At the highest frequency the geometry results in the interleaving of two comb-shaped structures so that the charging currents are spread out over a large area and the resulting power losses are small. Only one dee will be used. A similar system was described by MacKenzie but in this case two 45° dees confined to opposite valleys of a four-fold symmetry were employed.