Title
SUMMARY OF MEETING ON MATERIALS TESTING ACCELERATOR

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SUMMARY OF MEETINGS ON MATERIALS TESTING ACCELERATOR

Meetings held February 17 and 18, 1950 in Building 50, University of California Radiation Laboratory.

Present: G. Farly, W. Baker, W. B. Reynolds, R. Serber, E. J. Lofgren, E. M. McMillan, R. Thornton, J. S. Norton, W. H. K. Panofsky, L. W. Alvarez, M. Martin, D. Cooksey and E. O. Lawrence of the University of California Radiation Laboratory. K. MacKenzie and J. R. Richardson of University of California at Los Angeles. John Q. Cope and James Kent of California Research.

The principal point of discussion in these meetings was the effect of space charge (mutual repulsion of the accelerated particles) on the ability to keep the beam focused inside the drift tube apertures. On February 17 it appeared that an oversight had been made in the original calculations and that space charge de-focusing would be excessive. Various schemes to increase the strength of the focusing forces, such as the use of grids across the drift tube entrance apertures and magnets inside the drift tubes, were suggested. Also, the idea of using a rectangular rather than a circular aperture curved in the long direction to obtain focusing was suggested by Professor Lawrence. Increase of the tank diameter to 60 ft. was discussed. Between the meetings the calculations were repeated and by the time of the meeting of February 18, it was agreed among those who had gone over the calculations, that no error had been made and that the space charge spreading force for a 20 cm diameter spherical bunch was the order of 1% of the focusing forces. Panofsky and Lawrence presented a simplified calculation to show that the space charge and focusing fields were of the order of 100 and 10,000 volts/cm respectively.

There was considerable discussion as to the practicability and necessity of bunching the injected beam. One opinion was that interrupting or gating the injected beam would be preferable as it would not be difficult to obtain enough current from the injector to permit throwing away all except the current in the accepted phase range. It was generally agreed that space charge neutralization would be extremely difficult, if not impossible to obtain.

A proposed building design (drawings 4E7083, 4E7093 and 4E7103) was reviewed. Suggestions were made that the control room and maintenance shops be located farther from the tank as a wing of the main building or a separate building. It was also recommended by Baker that the pre-exciters and absorbers be located on the main floor below the oscillators.

It was agreed that locks would not be needed on the transmission lines, as pumps are to obtain a good vacuum in the order of three hours.

It was decided not to use concrete as part of the tank as leak hunting presented formidable problems and changes in the tank openings would be very difficult to make.

Copper clad steel or a separate tank liner was discussed but discussion deferred until February 25, when all the tank specifications are to be frozen.

The size of the tank is currently 36 ft. inside diameter, tapering to 27 ft. in the 60 ft. accelerating section.

Current thinking on the drift tube aperture is at least 7" dia. (18 cm) at the entrance, increasing to 4 to 6 ft. at the exit. To reduce the excessively strong focusing in the first gap, the first drift tube aperture may be made several feet. This would somewhat increase the peak R.F. power required to maintain the 27 Mev in 60 ft.

W. M. Brobeck

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