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Report on our trip to DESY, Hamburg

We visited DESY at Hamburg on 15th and 16th March to discuss common problems concerning ejection and shielding. At the same time some information was obtained about the accelerator itself.

1. Ejection

After his return from the Cambridge Electron Accelerator (CEA), F.W. Brasse has again taken up work on the DESY ejection system as described in the notes A 2.55 dated 16.12.1959 and A 2.66 dated 4.7.1960. The emphasis is on the "slow" ($\approx$1.2 ms) system, which is based on the same principle as the one proposed by H.G. Hereward. Differences in details are that deformation of the closed orbit is used to shift particles into the unstable region of the vacuum chamber rather than the magnetic guiding field (the shape of which is unalterable on account of the resonant excitation) and that a special current bar is used to produce the field perturbation as compared to quadrupole and sextupole lenses in the CERN case (none of which are planned at DESY for the moment). Detailed calculations exist of the particle orbits and several studies were made to find the best paths through the stray field.

2. Shielding

C. Passow has just published the results of his evaluation (A 2.85 dated February 1962) of the cascade processes interesting for shielding calculations. Experimental verification is being worked on and should be available in about 3 weeks. If confirmed, the conclusions could be used directly in the design of beam stoppers.

As regards the shielding of the side walls and the roof for an ejected beam, no detailed information on the particle distribution resulting from collisions in heavy targets is available. Some indication should come from plate exposures in the pulsed field made by our emulsion group.

A computer programme for labyrinth calculations is being developed, which could be useful to us.

3. DESY

a) Linac

The linac performs very well, the measured emittance being about 4 times better than the specified one with all other specifications kept. Max. current is 250 mA (for 1.8 μs); current for normal operation 140 mA at 40 MeV $\pm$ 0.5 o/o flat top during 1.3 μs; emittance 4 mm x 0.25 mrad.

b) R.F.

The decision klystrons or triodes is not yet taken, however klystrons will probably be used to begin with.

Another important point under study is the usefulness and feasibility of a phase lock system (the need of which is less clear than for the CPS as constant frequency acceleration is used). For this an analogue has been developed in which the cavities are represented by a quartz tuning-fork and the effect of the beam loading is simulated by electronic signals, the whole being run on the large Pace computer.

c) Magnet

Measurements on a prototype unit have shown that the rounding off of the end blocks has been a success in that the focusing length L_B is independent of the radius and therefore $L_B = L_G$ (and the additional eddy current heating is negligible). Block and coil making is going ahead. Instead of araldite a new rather complicated gluing technique is used which results in a more elastic bond. This leads to more even magnetic properties at low fields. A p.f.w. design is under way in which each wire is held in position rather rigidly.

d) Vacuum

The new design of the vacuum chamber involves the use of titanium band which is wound up similarly to the previous wire design. Results look encouraging. A prototype is being irradiated in the linac beam.

e) Controls

Seen in passing : precision voltage switch (10^{-4} for both voltage and time of switching); low frequency transistor amplifier 25 x 75 x 30 mm (6 V supply) for 1 W output power; price Fr 27.—.

f) Buildings

Experimental hall No. 1 is finished and being used for magnet assembly. The cranes look very nice, being of low height. Hall No. 2 is roofed in.

The ring building is finished except the ring beam itself, which is being made at present.

4. CEA

News from the Cambridge accelerator was that on Wednesday, 7th March at 15.30 they obtained for the first time acceleration up to 2.1 GeV with about 3.5 mA remaining up to that energy. Heating up of the self did not allow to go higher immediately.

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