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ADVISORY COMMITTEE ON VISITING TEAMS

Fifth Meeting
Geneva - 6 October, 1959

PERFORMANCE OF THE SYNCHRO-CYCLOTRON

May to August, 1959

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PERFORMANCE OF THE SYNCHRO-CYCLOTRONMay to August, 1959

During the period since the last meeting of the Advisory Committee the cyclotron has generally been working well 24 hours per day, with maintenance for two shifts each Monday, preceded by one shift for cooling down. More time than previously has been allotted to technical development and improvement of the machine. This has made possible the replacement of several unreliable parts. In particular the pick-up system used for synchronizing the drive of the tuning fork is now working well. Phototransistors that quickly became damaged by radiation have been replaced by vacuum photo cells with good results. The cause of dips in the radiofrequency spectrum have been localised to the stubtank condenser and an expectedly good solution found. Another type of ceramic condenser has been ordered and will be delivered in November this year. In the meantime, a temporary solution is used to avoid the dips, requiring rather critical setting of the tuning fork amplitude and pulsing of the high-frequency. With proper attention this has worked very well.

During the 2,386 hours when the cyclotron has been scheduled for operation, the total time of faults was 286 hours or 12%. The longest break, 68½ hours was due to a water leak in the cyclotron tank. Throughout this time some work on the ion source and the high-frequency system could be undertaken. Another long break - 57 hours, was due to an air leak in the hydrogen pipe to the ion source. Due to the high activity in the tank the machine had to be left to cool down for two days before the real repair could be started. Other faults were: arcing on MG set due to loosened cables; leaking mylar windows and different faults on the RF system such as arc back in high voltage rectifiers, stuck contacts in the tuning fork positioning system, and on one occasion, a broken grid condenser.

It is interesting to note, as can be seen from the following table, that when the cyclotron is running well the experiments require the beam off or reduced by chopper during over 30% of the time. Without simultaneous improvement of the counting equipment the time taken to go through most experiments cannot be reduced by any large factor even if the beam intensity could be considerably increased.

The cyclotron time has been used in the following manner:-

	<u>Time</u>	<u>Percentage</u>	
Cyclotron staffed	2738 hours	100%	
Maintenance	260	9.5	
Improvements	92	3.4	
Faults	286	10.4	1
Cyclotron available	2100	76.7	100%
Changing or repair of experimental set-up	347	12.7	16.5
Beam on	1753	64.0	83.5
thereof:			
Chopper-reduced beam	350	12.8	16.7
Full beam	1453	51.2	66.8

The long break previously planned for June - July, to install the muon channel and to change the pi-channel arrangement in the neutron wall has been postponed and is now scheduled to start mid-November. Also during this break an automatic control of the cooling water temperature will be installed to facilitate the work of the operators. If the primary cooling is left on when the current in the bending magnets is reduced, these soon cool enough to get covered with condensed water which, on one occasion, caused damage to the coil insulation.

Other improvements which are being considered for later installation are: a stochastic beam extraction from the ion source in order to get higher beam intensity and electrostatic deflection of the beam to get a short (20 μ sec) pulse of mesons for lifetime measurements. Besides these, a large number of small improvements are worked out and installed when time permits, in order to increase the reliability and usefulness of the cyclotron.

September 19th, 1959.

Bengt Hedin.