CDJ/BW/cj 19th August 1983

AC DESIGN GROUP

Summary Record of the Meeting held on 16 August 1983

Present: M.Bell, G.Carron, V.Chohan, T.Dorenbos, D.Fiander, Z.Guo, W.Hardt, M.Harold, H.Horisberger, C.D.Johnson (chairman), H.Koziol, F.Malthouse, S.Milner, G.Nassibian, F.Pedersen, A.Poncet, L.Rinolfi, T.R.Sherwood, A.Sullivan, U.Umstätter, V.Vaccaro, S.van der Meer, F.Völker, A.Wrülich, B.Williams

1. Introduction

This meeting, with some of our European collaborators present, was one of a short series now concentrating on the production of the AC Design Report. The agenda had been drawn up with the intention of focussing our attention on some of the major hardware layout features of the AC Ring.

2. Lattice layouts

B.Williams illustrated with drawings of magnet layouts two solutions for the installation of the AC in Hall 193 based on lattice 83-08 and the variant 83-08d of W.Hardt. R.Sherwood described another variant involving the use of two semi-quadrupoles in each quadrant; to facilitate injection in the fourth quadrant and to preserve symmetry in the other three. This lattice was given the identifier 83-08s. Z.Guo is looking at the change in geometry caused by the redistribution of bends. Other consequences might be the need for an extra power supply and some loss of flexibility but the proposal was generally well recieved, it is retained for further consideration.

W.Hardt had done some investigation into a version of 83-08 with wedge magnets. The result was that the D-quads would become much stronger, but more interesting it revealed a fault in AGS, which gives the wrong geometry when used for parallel-end magnets.

3. Multipole correction elements

C.Johnson outlined some of the problems which could arise in producing a magnetically clean machine with well known distributions of multipole elements. A.Wrülich then gave an account of his stability studies on lattice 83-03 using the DESY program RACETRACK. He will now make some checks on lattice 83-08 in which the sextupoles are: a) in the ends of the dipoles only, b) in all the quadrupoles. We will also try to simulate the effects of interference between dipoles and quadrupoles. Z.Guo will also make some tests on various sextupole schemes using PATRICIA.

4. Location of cooling tanks

S.Milner described the present designs of the cooling tanks with moving electrode structures based on lattice 83-03. They can only with difficulty be fitted into lattice 83-08. At first sight lattice 83-08d is even less favorable but S.van der Meer pointed out that a smaller number of longer straight sections might be preferable since for the same total length of electrode structure one might manage with fewer tanks with some saving in costs. This will be looked into.

5. Target area

R.Sherwood outlined some of the present and future proposals for target area modifications. These are based on his account in the summary of the Antiproton Collector Study (AA Long Term Note 26). A pressing question is: should one reduce the number of off-momentum particles entering the AA/AC hall by providing better momentum selection, i.e. a spectrometer layout within the target area ? The requirement to transport a beam of 6% momentum bite at 200 pi mm mrad makes some form of spectrometer arrangement essential, otherwise there will be large tails on either side of the momentum distribution with correspondingly increased radiation problems in the machine hall. This need was recognised and S. van der Meer suggested that one relatively simple solution might be to make better use of the present dipole, BHZ, downstream of the target by rearranging the beam optics to give larger horizontal beam size within this magnet and hence improved momentum resolution $\pi/2$ further downstream.

R.Sherwood also mentioned the possibility of a collaboration with the Culham laboratory on the design and specification of pulsed current power supplies for lithium lenses and current carrying targets. The aim is to have completed a design study by the end of October.

6. RF for bunch rotation and rebunching

H.Koziol and F.Pedersen gave a detailed explanation of the process and present proposal for bunch rotation. Simulation studies at Fermilab have shown that optimum reduction of momentum spread is attained when the RF voltage is such that the bunch length after rotation is π ,and, as the h value for 83-08 is 0.0225, F.Pedersen was led to propose a cavity operating at 1.32 MV. The charging time would be 250 μs followed by about 70 μs of bunch rotation, the voltage during the last 20 μs being pulled down to 176 kV. Then, following W.Hardt's proposal to gain further momentum reduction by adiabatic debunching, the voltage would be reduced to 7kv over a period of 5 ms, possibly relying on the natural time constant of the cavity. The high initial voltage would best be handled by installing two cavities positioned at 2 and 4 o'clock and W.Pirkl is now preparing a new design for this double cavity solution.

The rebunching cavity could be situated in a long SS such as that at 7 o'clock between QDW 35 and QFW 36.

7. Magnets

M.Harold agreed to look into the design of the half-quadrupoles mentioned in section 2, with the intention of covering this feature in the design report. He also remarked that the 7 T/m gradient in the QWF2 quadrupoles required for lattice 83-08 could cause shimming problems. Any lattice modification that reduced this gradient would be welcome.

8. Next International Meeting: Wednesday 7th Sept. at 09.00 in the PS Auditorium.

Agenda: Review of Sections I & II of the design report.

C.D.Johnson, B.Williams