SUMMARY OF THE ACOL DESIGN GROUP MEETING OF 20th DECEMBER 1983

The meeting was held essentially to inform our external collaborators about the current status of ACOL and further crystallisation of ideas on the ACOL lattice, beam transfer schemes, chromaticity corrections and a preliminary progress report on the semi-wide quadrupole design. Most of our external collaborators from the various institutes including Rutherford Laboratory (Magnets), NIKHEF (Septa), University of Graz (End Field calculations), University of Genoa (Theoretical calculations) were able to be present.

Lattice

W. Hardt presented the lattice 83-13 and pointed out the principal features and advantages over the previous lattices. For the purposes of further discussion, lattice 83-13 **remains** the final lattice and has 2.25m in the straight sections in the arcs as opposed to 1.90 m in lattice 83-12.

A question raised by R. Sherwood on permissible proximity of kicker elements in the afore-mentioned straight sections to the lattice magnets led to a discussion and a decision that the Magnets team should ensure the maintainibility of their good field and provide numbers to the users of the straight section space to minimize interference. It was stated that qualitatively, the field dies faster from a quadrupole than a dipole and since there are quadrupoles at both ends of these straight sections, one could get much closer without having proximity effects than the limit between a dipole and a quadrupole elsewhere in the arcs.

Beam Transfer and Implications on Magnet Design

S. Maury elucidated the injection (into ACOL) and ejection (to AA) schemes and re-emphasized the points already mentioned in the Design Yellow Report, namely:

a) introduction of another 1/2 quad. in the injection line facing QDS53.

b) lateral displacement of BHS24 by ~10 cm.

c) Closeness of (rectangular) injected beam to the vacuum chamber in QDN55 (leaving no room for a pick-up).

While points a) and b) were generally accepted, much discussion ensued from c) including the validity of considering a rectangular beam (instead of circular), the already built-in tolerances for magnet apertures, putting wide quadrupoles only everywhere, etc.

It was finally **decided** that:

i) No re-design of the narrow quads should be envisaged.

ii) The mixed solution of 20 narrow and 20 wide quads should be kept.

iii) the pick-up near section 55 is important enough to be kept even at the expense of putting it in the straight-section instead of in QDN55.

iv) R. Sherwood/S. Maury will provide numbers for the clipping if rectangular beam is considered, etc. before a final decision on PU55 placement is taken as well as numbers for the choice of QD52 being a wide or a narrow quadrupole for separation between circulating beam and extracted beam in ACOL.

v) Cost estimates for the all wide quadrupole solution will be carried out by the Magnets team as well as verifying the placement feasibility in the AA hall especially at 12', 3', 6' and 9' o'clock positions due to closeness to the AA magnets.

For the ejection from ACOL to AA, kicker modules will be placed in the arc straight sections and a slow bump will be necessary. The start of the slow bump coincides with the sextupole magnets in the straight section and a coupled solution (sextupole magnet(s) with bump coil) is envisaged.

For the radially displaced dipole BHS24 with its special narrow coil and a hole through the outside return leg, due donsideration will be given if cost savings cannot be made by designing a one-off special dipole altogether.

Semi-Wide Quadrupole Design

M. Harold reported on the latest 3-D work for this design and associated problems (increase in effective length as one approaches the mirror plate, etc.). Although work is still in progress, it was opined that the semi-wide quadrupole may not turn out to be "half" of a normal wide quadrupole and a custom-built design may be necessary.

Chromaticity and Corrections

Z. Guo presented the work carried out over the last few months and that can be summarized as follows:

a) We have programs like MAD, CHROMAT and PATRICIA which agree within a few percent to give us numbers on natural chromaticity in an uncorrected lattice 83-13. (W. Hardt has subsequently modified his program and that too yields the same numbers).

b) The program RACETRACK does not agree completely with the above mentioned program, especially in Q_V' and, therefore, the validity of using RACETRACK for tracking can be challenged.

c) The natural chromaticity in lattice 83-13 can be reduced from Q_H' = -5.59, Q_V' = -6.01 to nearly -0.2 (both) by (i) introducing shims in dipole ends (ii) sextupole profiling in wide quadrupoles and (iii) putting special, physical sextupole magnets in the 2.25 m straight sections in the arcs. The final scheme proposed uses all three aspects with the additionally imposed conditions of no shims in dipoles BHS24, BHZ19 and matching (total 8) and no profiled corrections in quadrupoles 52, 46 and matching (total 8). The numbers obtained for $B''\ell/B\rho)$ m^{-2} for all three correction components are within the realisation limits imposed by the Magnets team.

d) Work is in progress to introduce sextupolar components in the zero α_p sections for resonance compensations, etc.

e) The design of the physical sextupoles has to be tackled in early 1984 using the numbers obtained in c) above.

V. Chohan