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Tune and Chromaticity Correction

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Subject Tune and Chromaticity Correction

Observations and Conclusion

At three points in the cycle we have measured tunes as a function of radius for the following cases:

a. bare machine
b. programs in the horizontal and vertical quad strings as suggested in Studies Report No. 182
c. with the quads and the horizontal sextupoles programmed to reduce the horizontal chromaticity

In all cases the skew quads were powered in such a way that coupling between the two transverse planes was at at minimum. At the highest momentum point, the 60 A available was inadequate.

Coherent oscillations were excited by the tune meter kickers. The tune was measured by filtering of PUE signals in the MCR and feeding these signals into a gated frequency counter (we tuned the filter such that we measured the lower side band frequency of the coherent oscillation).

The results are summarized in Tables 1, 2 and 3. The tunes given are for zero radius as indicated by the PUE system.

Table 4 gives the value of the currents in the different strings at the three measuring points.

Table 1
(@ 35,000 GC)

	Bare Machine a	Quads b	Quads + Sext c
ν_H	8.70	8.662	8.692
ν_V	8.752	8.795	8.782
ξ_H	-2.34	-2.34	-1.15
ξ_V	-0.24	-0.24	-0.78

Table 2
(@ 45,000 GC)

	Bare Machine a	Quads b	Quads + Sext c
ν_H	8.688	8.650	8.696
ν_V	8.746	8.799	8.779
ξ_H	-2.61	-2.54	-0.49
ξ_V	+0.06	+0.05	-0.78

Table 3
(@ 55,000 GC)

	Bare Machine a	Quads b	Quads + Sext c
ν_H	8.648	8.577	8.627
ν_V	8.714	8.815	8.785
ξ_H	-3.36	-3.37	-1.17
ξ_V	+0.94	+1.01	-0.12

Table 4

	35,000 GC	45,000 GC	55,000 GC
I_H Quad (A)	15	20	42
I_V Quad (A)	25	43	100
I_{Sext} (A)	130	280	390
I_{Skews} (A)	37.5	50	60

Conclusions

The results for the bare machine are in agreement with previous measurements (see Studies Report No. 182).

We are able to control the chromaticity to values of about 1 throughout the cycle in both planes by using the horizontal sextupole string only.

The quads have been programmed in such a way that the vertical tune was approximately 8.78 throughout the cycle. The program for the horizontal quad string does not seem optimal yet, because we are crossing ν_H = 8-2/3 between 45,000 and 55,000 Gauss Counts, while the intention was to hold the tune above the 8-2/3 line.

mvh