

Check Discrepancy Between Calculated and Expt. Emittance

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NO. 14

Blumling

Injection Studies

J. Claus

April 25, 1973
0400 - 0800

Objective:

To trace cause of discrepancy between computed consequences of emittance measurements and experimental evidence.

Procedure:

Measure emittance of 200 MeV beam using PDP-10 program "MENIL", calculate expected beam behavior using PDP-10 program "ORTHO" and compare it with experimental beam profiles obtained by means of SEM scans, using SEM 7, 8 and 11. Additional information is yielded by the currents intercepted by the copper blocs of the aperture restriction at the inflector entrance.

Results:

Measurements were taken as planned. Had some difficulty because it was not realized that emittance measurements and SEM scans are incompatible so that they must be done consecutively rather than simultaneously. Program MENIL may not be on the computer during SEM scans. The discrepancy noted previously (April 17-18) was still present. The indicated emittance had changed drastically since that time, particularly for the vertical plane. Comparing the raw data with the profiles from SEM 7, we concluded that the analogue electronics for the emittance measurement may be sick. It seems to respond non-linearly, beginning to saturate at low signal levels. The copper bloc measurements suggested that the beam is more than 4 cm high and displaced upward with respect to the inflector center line.

Since the machine operated nicely (34 mA during 100 μ sec on AGS 1 producing a peak circulating beam of 10^{13} and an intensity of $(4.7 - 5) \times 10^{12}$ just before transition), I spent the rest of the time on another short sample efficiency run. For the first time I obtained a practically triangular efficiency curve while the loss pattern suggested a v_H very close to 8.6.