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Vertical Phase Space Dilution Studies at Injection

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Subject Vertical Phase Space Dilution Studies at Injection

OBSERVATIONS AND CONCLUSION

Procedure: A five turn spiraling beam of $\geq 4 \times 10^{12}$ was obtained and then this was reduced to less than full turn. The vertical sum and difference signals from a single PUE station were photographed at three different settings of the steering supplies NP447, 456. Next the sum and difference signals from six PUE stations were photographed at the nominal operational values of NP447, 456.

Results and Conclusions: The rapid vertical closed orbit variation takes place over $\approx$ 150 μsec from injection. This corresponds to the decay of the A-13, B-7 half λ bumps used for multiturn injection. The peak-to-peak vertical closed orbit variation is about 6.5 mm and is apparently due to the residual effect of a small radial component of the field produced by these bump coils. A maximum of this distortion occurs near the J-19 target ($\approx$ 90% of peak) and is such that the orbit moves upward with time. This is in complete agreement with the observation of #97 regarding targeting effects on the spiraling beam.

This orbit distortion, however, does not contribute significantly to the vertical dilution since the bump collapse rate is still essentially adiabatic. There remains, nevertheless, another more serious effect that is responsible for the $\approx$ 1.3 cm peak-to-peak oscillations present in the spiraling beam after three revolutions. The coherent amplitude of the first three turns as seen on a single electrode was smaller than this for three of the four sets of steering dipole settings employed. That is, it appeared as if the beam received an additional kick vertically after three turns. It has not yet been possible to reduce the later coherent amplitude much below the 1.3 cm peak-to-peak value at a β_{max}. The possibility of a kick due to the stray field of the inflector which the beam will generally strike on the third turn since $\nu_x \approx 8\ 2/3$, is under investigation.