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Affect of Lower B on Capture Efficiency

E. Raka

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Collider Accelerator Department

Brookhaven National Laboratory

U.S. Department of Energy

USDOE Office of Science (SC)

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AGS Studies

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E.C. Raka, E. Gill

Purpose: To lower the injection $\dot{B}$ value with the hope of increasing the rf capture.

Background: Measurements made on 4/24/73 indicated that with the present $\dot{B}$ of $\approx$ 2.6 kG/sec and a nominal setting of rf level 2, the equilibrium phase angle near injection is $\approx 21^{\circ}$. This corresponds to a bucket of $\approx 220^{\circ}$ width, height of .055 eV-sec and area of .29 eV-sec. The bunch width a few msec after injection was measured to be about 210°. The total net gap voltage, calculated from the $\dot{B}$ and measured f_{φ}, was found to be $\approx$ 50 keV or about 1.6 kV/gap (8 stations on this date).

Results: The injection $\dot{B}$ was lowered to $\approx$ 1.45 kG/sec and the rf parameters adjusted for best intensity (this was 3-4 $\times 10^{11}$ less than with the higher $\dot{B}$). The bunch width a few msec after injection was measured and found to be $\approx 210^{\circ}$. At the lower $\dot{B}$ and with the same gap voltage (50 kV) the bucket width should be $\approx 275^{\circ}$. A measured bunch width of 204° was obtained at the larger $\dot{B}$ ($\approx$ 2.6 kG/sec). One would have expected a wide bunch and perhaps a higher intensity, but this was not the case. Intermediate values of $\dot{B}$ were also tried, i.e., $\approx$2 and 2.3 kG/sec.and they gave essentially the same intensity as obtained at 2.6 kG/sec. The latter value was retained for operations.