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SEB Efficiency with H₂O Electrostatic Septum

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1. Participants: Blumberg, Glenn, Soukas
2. Purpose: To further study AGS slow extracted beam operation with H20 electrostatic septum. Specifically to align and stabilize the "shadow" of the H20 septum on the F5 magnet septum thereby reducing the beam loss at this location. Previous studies had shown the split at F5 which is caused by the H20 electrostatic septum kick to have an inward motion approximately equal to the amount of separation.
3. Scheduled Time: May 3, G10 off, some erratic beam May 3, 1000-1200.
Actual Time: May 3, G10 off, some erratic beam, May 3, 1430-1630.
4. Results: The ring multipoles were set to $Q_H=160$ A, $Q_V=200$ A.
 - (A) The F10 PBLW bump was programmed to rise about 40 amps in order to hold the "shadow" at a constant location on the F5 flag. (Though a 30 amp jitter in the PBLW current did not noticeably affect extraction, the ramp did help.
 - (B) The H20 bump, skew, F10 bump were varied to maximize extraction which improved from $\sim 73\%$ to $\sim 84\%$. The F area losses dropped by 60% and F5 losses by 63%. Total ring losses apparently dropped by 30% (relative efficiencies of the ring loss monitor to F5 and H20 loss have not been carefully checked).
 - (C) The SEB resonance sextupole current was reduced by 10% to reduce the spiral pitch. The extraction efficiency increased to 90% and H20 losses dropped by 38%.
 - (D) There was a large ($\frac{1}{2}$ of total) loss at H20 early in spill, presumably due to a high energy tail on the beam.
5. Conclusions: Throughout the test the septum acted as the computer model predicted. The septum should be used operationally starting in August. The various loss monitors must be more precisely calibrated to give absolute values for the various beam losses. The debunching of the beam is critical and must be more closely controlled for this operation. The H20 and F10 bumps must be matched (probably H20 should be a $3/2 \lambda$ bump). An appropriate clean-up target and location should be investigated to reduce H20 early beam loss.

cc: Studies Group