PS/AA/ME/Note 68 11th August 1983
CDJ/cj

AA - ME - NEWS

Summary of Period 3: July 14th to August 8th, and ME meetings on July 13th and August 2nd.

This period started with a scheduled 36-hour ME followed by a 12-hour setting-up session. A further 12 hours was allocated to setting-up after the PS MD on the 29th July. Due to a water leak soon after startup and various other hardware faults provoked by the record breaking summer temperatures, aggravated by their occurence at inconvenient times, and the absence of some specialists , about one half of the ME time was lost.

Changes to the HF cooling systems had been made along the lines described in ME Note 64, and so at the expense of good antiproton yield optimization, most of the setting-up time remaining after curing further hardware problems was used to retune the HF systems. This work, together with a major effort over the weekend following the PS MD, finally led to missing factors of 6 to 6.5 during stacking for the ISR and LEAR. The 20% shortfall compared to our previous best missing factor of just below 5 was due to low antiproton yield, which was only brought up to scratch during an injection tuning exercise after the last antiproton transfer at the end of the run, emphasizing the need to have adequate time for both yield and cooling optimization before each run.

HF Cooling.

Prior to this run the signal lines from the HF transverse cooling tank in section 1 were re-trimmed, tank alignment was checked and automatic compensation of phase with attenuator setting was added (PS/AA/Memo 83-28). Also the filters were changed to a hybrid-bridge configuration, which is expected to give improved betatron cooling.

Two immediate benefits were the reduction of common mode signal and the greatly improved phase compensation of attenuation. The new filters gave promising results with a proton stack (reverse polarity), but were found to be interfering with the stack tail during normal antiproton stacking. A partial cure, plus the temporary expedient of switching out the horizontal filter during stacking, led to a good workable situation giving emittances in both planes of less than 2*pi mm mrad within 30 minutes of stopping stacking. Final emittances with a stack intensity of 1.4 Exp+11 were 1.2*pi horizontally and 1.7*pi vertically.

Soft aperture limit and coupling.

The horizontal aperture was studied using protons kicked to large betatron amplitudes at various frequencies within the injection region. This gave further evidence of residual transverse coupling even after optimization of the squew quadrupule current. An experiment to reduce this coupling by combining a tilt of QFN24 with the squew quadrupole had to be postponed for the reasons mentioned above. A scan

of the antiproton amplitudes in the injection line using the horizontal collimator looked interesting enough for us to defer its planned removal from the line, again largely because we could not complete the measurements within the time available.

At the suggestion of R.Billinge we made a partial scan of the AA aperture using scrapers in the zero dispersion region during antiproton stacking. This was to answer the question: does the differential stacking rate have the same dependence on aperture as the injected antiproton distribution ? The answer seems to be yes. ME notes are in preparation.

Transverse blow-up during transfer of antiprotons to the SPS.

An ME note (PS/AA/ME/Note 67) by E.Jones and L.Rinolfi discusses the observed blow-up of the second and third pulses of a triple shot to the SPS. The cause appears to be outside the AA. S.Van der Meer suggests making measurements of coherent oscillations of proton shots into the AA under conditions where all the ejection, transfer and injection elements between PS and AA are pulsed one and two times before the transfer itself. Pre-pulsing the AA ejection kicker alone did not produce significant increase in the coherent oscillation amplitudes.

Antiproton yield.

During this run antiproton yields were around 4.8 Exp-7 which is to be compared to 6.5 Exp-7 in March 1983. A change of target at the start of period 3, followed by the installation of a replacement horn during the PS MD did not immediately lead to any measurable improvement. At the end of the run R.Sherwood was able to nudge the yield back up to 5.4 Exp-7 by fine tuning the injection line, in particular the vertical steering. The effect of inserting screen 68 just after the collimator downstream of the horn was to decrease the yield by 4%. Its 3m air equivalence is to be compared to the 10m of air between the target and the start of the injection line vacuum. The use of a helium-filled tube in this region could give us a 10% improvement in yield.

C.D.Johnson