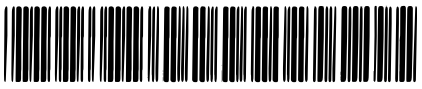
Madame Patricia MARTUCCI E-6

ISR-BOM/PJB/ml 18 February 1981



ISR PERFORMANCE REPORT

Antiproton Transfer to ISR (No. 1)

First Test of TT6 - 23 GeV/c - 13th and 14th February 1981

From midday on Friday 13th February, TT6 was on standby for the first antiproton ejection from the PS, but unfortunately before this test could be started the AA lost its record stack of nearly 3×10^{10} antiprotons due to a vacuum leak. With only a few hours of the run remaining, the leak was repaired, a new stack was made and the PS was able to attempt the first ejection into TT6 just before midnight. The first pulse was only 2×10^{8} antiprotons and it was lost at transition. A second pulse, of 6.9×10^{8} antiprotons, was accelerated to 23.021 GeV/c and 4.4×10^{8} antiprotons were successfully ejected, but unfortunately the liaison between AA, PS and ISR via the intercom and telephone lacked the necessary co-ordination and the TT6 pickups were not ready. On the third attempt at 00.12 h, all systems functioned correctly and the first pickups in TT6 recorded the passage of a beam of 4.5×10^{8} antiprotons. Four more attempts were made, but these were either lost in the PS or were of a too low an intensity to be seen. The test stopped at 01.05 h Saturday 14th February.

The printout of the storage registers of the pickups after the second and third pulses are shown below. As the second pulse was missed the registers contain only residual zero errors, but for the third pulse the first three pickups have overwritten these residual zero errors with measured data. The beam must have been lost between PU606 and PU611, since the remaining pickups did not trigger and their registers still contain the residual zero errors from the earlier shot. The current transformer at the entry to the TT6 was unable to confirm the transit of the beam as it did not receive its timing pulse.

It should be remembered that the precision of these readings is certainly poor, since the intensities of these pulses were well below the design minimum operating value of 10^{9}, but it is also clear that they are not random. The following calculations may not be very accurate but the values appear reasonable.

Second Pulse (4.4×10^8)

81-02-14 00H08M46S

BEAM TRANSFER OBSERVATION
PULSE NO: 48508 RUN= 1174
602: 0.00 449: 0.00
NO OF MEASUREMENTS TAKEN: 1

PU	X	Y
602/ 602	0.10	-0.09
603/ 603	-0.00	0.02
606/ 606	0.00	0.00
611/ 611	0.12	-0.05
616/ 615	-0.10	0.05
619/ 619	0.00	-0.05
624/ 625	0.00	0.00
435/ 434	0.05	0.03
442/ 442	0.11	0.08
448/ 448	0.02	-0.05
449/ 449	-0.09	0.00
450/ 450	0.12	-0.01
451/ 451	0.06	-0.06

Third Pulse (4.5×10^8)

81-02-14 00H11M38S

BEAM TRANSFER OBSERVATION
PULSE NO: 48558 RUN= 1174
602: 0.00 449: 0.00
NO OF MEASUREMENTS TAKEN: 1

PU	X	Y
602/ 602	-2.18	-2.36
603/ 603	1.59	-0.85
606/ 606	-18.98	6.25
611/ 611	0.12	-0.05
616/ 615	-0.10	0.05
619/ 619	0.00	-0.05
624/ 625	0.00	0.00
435/ 434	0.05	0.03
442/ 442	0.11	0.08
448/ 448	0.02	-0.05
449/ 449	-0.09	0.00
450/ 450	0.12	-0.01
451/ 451	0.06	-0.06

Position and angle at entry to TT6 main bend (i.e. at PU603)

Horiz. x_{PU603} = 1.59 mm ; $x'_{PU603} = \left(\frac{1.59 + 2.18}{10.75}\right) =$ 0.35 mrad

Vert. y_{PU603} = -0.85 mm ; $y'_{PU603} = \left(\frac{-.85 + 2.36}{10.75}\right) =$ 0.14 mrad

Momentum error measured using PU606 at centre of main bend

$$x_{PU606} = -18.98 = (-2.99 x_{PU603} + 9.69 x'_{PU603} - 6.51\, \Delta p/p)$$

$\Delta p/p$ = 2.7 per mil

Since the ejection energy was 23.021 GeV/c and the line was set for 23.000 GeV/c, $1/3^{rd}$ of this error can be accounted for.

Reason for loss

Using the initial conditions derived above and tracking through TT6 does not lead to an excursion large enough for a total beam loss, but one can speculate that a partial loss reduced the intensity below the threshold for triggering the pickups.

Antiproton working group