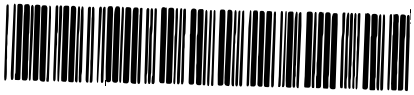
Mlle P.



ISR-MA/RP/PJB/JB/rh

15th August 1973

ISR PERFORMANCE REPORT

Run 342 - 7 August 1973

Rings 1 and 2 - 26 GeV/c - 20 bunches

SFM Running-in (No. 2 - 5C26 with SFM at 1.0 T)

Conclusion

Closed orbit and working line checks in Ring 1 showed no changes due to the SFM. The checks in Ring 2 were omitted to give more time for stacking.

With stacks of 11.65 and 11.63 A on 5C26, the luminosity in I5 was 2.8×10^{30} $cm^{-2}s^{-1}$ (and by calculation 2.3×10^{30} $cm^{-2}s^{-1}$ in I4). The decay rates of these stacks were somewhat higher than has been achieved without the SFM in the past, but are not high compared to recent machine behaviour. The especially high loss rate in Ring 1 is attributed to the dump block, which was later found not to be moving correctly.

Measurements and results

1. Closed orbit

The distortion on central orbit in Ring 1 was:

	Horizontal	Vertical
Peak-to-peak	5.1 mm	8.0 mm
R.m.s.	1.1 mm	1.6 mm

Unfortunately, there was no opportunity at the end of the run to re-measure this orbit without the SFM. However, it is clear that the compensators are well adjusted.

2. 5C26 Working line in Ring 1

Figure 1 shows the 5C26 working line with the SFM at 1.0 T in Ring 1. No corrections are thought to be necessary. On the basis of

of these results and the measurements made at 22 GeV/c, the checks in Ring 2 were omitted to give more time for stacking.

3. Stacking

A stack was made in both rings on 5C26.

	Ring 1	Ring 2
Top mm	+ 40	+ 40
Bottom mm	+ 3	- 14
No. of pulses	264	416
Step-back Hz	8	8
Shaved to mA/pulse	56	56
Stacked current A	12.47	12.25

The stacking in Ring 1 was perfectly regular and there were no changes in slope on the chart recorder, which often occurs when the stack reaches a fith order resonance. The Schottky scan, however, showed well defined dips after steering (see Figure 2). In contrast, the stacking in Ring 2 was irregular, but the Schottky scan showed a surprisingly uniform stack even after steering (see Figure 2). The beams were steered in I4 and I5 without any difficulties. From the maximum beam-beam rate in I5 the luminosities in I5 and I4 were calculated, using the standard I5 monitor constant ($\sigma = 1.2 \times 10^{-27}$ cm^2 at 26 GeV/c) and the theoretical crossing angle in I4 (17.971^o for 1.0 T at 26 GeV/c).

	Luminosity $cm^{-2}s^{-1}$	h_{eff} mm	I-R1 A	I-R2 A
I5	2.8×10^{30}	4.8	11.65	11.63
I4	2.3×10^{30}			

The decay rates of the two stacks during the run are summarized below:

Conditions	I_1 A	I_2 A	$\frac{dI_1}{dt}$ ppm/min.	$\frac{dI_2}{dt}$ ppm/min.
Directly after stacking and scraping Ring 2. Ring 2 dump +4 mm. Single pulse in Ring 1.	0.08	12.07	0	220
Ring 1 stacked and scraped. Ring 1 dump -4 mm. Ring 2 unchanged.	11.96	11.81	296	196
After steering and optimization. Both dump blocks withdrawn by 0.5 mm.	11.73	11.67	350	136
Optimization for luminosity measurement in I5.	11.65	11.63	350	110
Ring 1 dumped	---	11.62	---	53

The above decay rates are high compared to loss rates of ~50 ppm/min., which have been achieved in physics runs in the past. However, the Ring 1 dump block has since been found to be moving incorrectly at one end and the especially high decay rate in Ring 1 is attributed to this. Although an increased excitation of the fifth order resonances is not excluded, it should be said that it was not possible to fully optimize the beams as the usual background signals were not available in the SRC.

R. Perin

P.J. Bryant

J. Billan

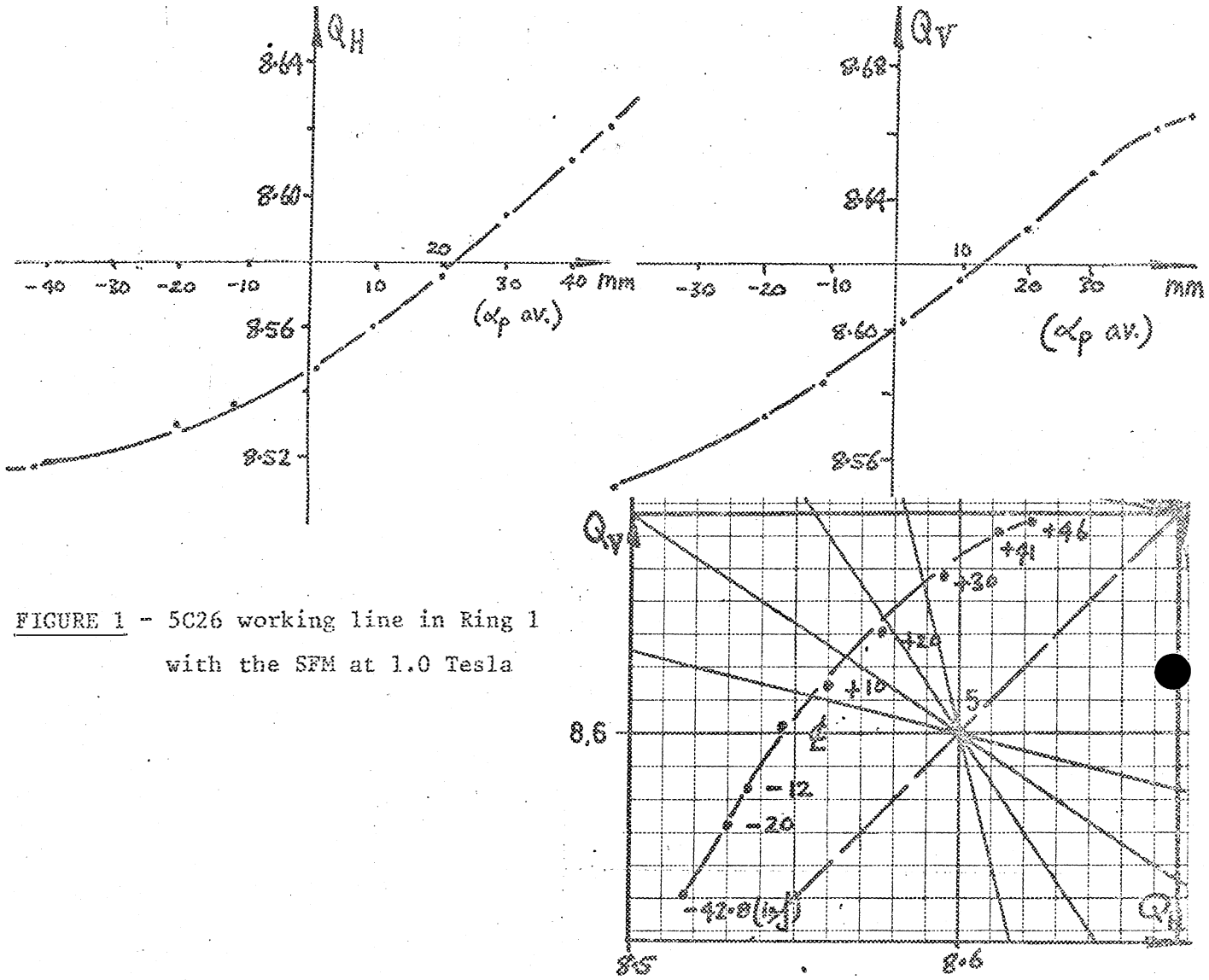
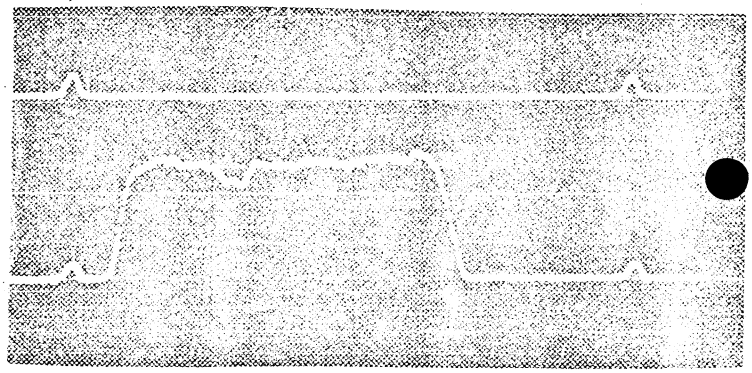


FIGURE 1 - 5C26 working line in Ring 1 with the SFM at 1.0 Tesla

FIGURE 2 - Schottky scans

a) Schottky scan of a 12.25 A stack in Ring 2 directly after stacking. No stack in Ring 2



b) Schottky scan of an 11.64 A stack in Ring 1 and an 11.63 A stack in Ring 2 after scraping and steering. (near end of run).