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TESTS WITH THE EJECTION FROM S.S. 62

The ejection of 15 GeV/c and 19 GeV/c protons from s.s. 62 was tested on 27th October and 6th November.

In order to obtain the resonant ejection, the following machine elements were used :

1) Quadrupole : Q_{61}
2) Sextupoles : 85^-, 95^+, 5^- , 25^+, 35^- , 45^+
3) Bump coils : 50^-, 59^+, 60^-, 61^-, 66^+, 67^+

The ejected beam was dumped by the beam stoppers inside the ring area. The layout of the first part of e_3 (used for the test) is sketched in Fig. 1.

The following detectors were employed :

1) A plate for the measurement of charge (positioned at TV 2)
2) Foils to measure the induced activity (")
3) A current transformer used for fast slow (F.S.) ejection placed at the intermediate focus (TV 3).

I. RESULTS OF THE MEASUREMENTS

The efficiency of ejection 62 was studied varying :

1) The distance of the septum magnet from the closed orbit;
2) The angle of the septum magnet with respect to the closed orbit;
3) The quadrupole current (optimizing sextupole and bump coil currents for maximum efficiency).

The agreement between the charge measurement on the plate and the results obtained from the induced activity in the foils was better than 5 o/o. As calibration of the plate we therefore used :

220 mV corresponding to 1×10^{11} protons
(See also note MPS/MU - NOTE/EP 66-41)

The calibration based on the current transformer for F.S. ejection is given with 194 mV corresponding to 1×10^{11} protons ejected. (From this result we could obtain efficiencies 10 o/o higher than given in this note.)

1) In Fig. 2 the variation of the efficiency is shown for different positions and angles of the septum magnet with respect to the equilibrium orbit. The increase of the efficiency ϵ with decreasing distance of the septum magnet from the closed orbit is an indication of a too low quadrupole strength. This will be more clearly seen in paragraph 3). The positions of the septum smaller than 58 mm require a larger bending by the septum magnet (20-22 mr) instead of 19 mr foreseen for the beam line (Fig. 4).

2) The slight influence of the angle over a range of 4 mr can be understood, if one considers the gaps and the angle of the two septum magnets for a beam of an horizontal width < 2 cm.

   The increase of efficiency at 54 mm (Fig. 2) for small and negative angles is, in our opinion, due to the fact that, in this case, a considerably larger part of the septum magnet acts as a target. This may be seen clearly if the detectors behind the bending magnet can be used (detectors in the East Area).

3) In Fig. 3 the efficiency ϵ is plotted as a function of the current of Q_{61}. It is obvious that an higher current is needed.

Some typical settings are summarized in a table on page 4 .

II. CONCLUSIONS

The efficiency reached for ejection 62 was 40-50 o/o. The maximum current for Q_{61} was limited during the two tests to 630 and 800 A respectively. The efficiency of the ejection increases with increasing quadrupole strength. Therefore an imprcvement may be expected. The efficiency given in this note refers to slow ejection. The efficiency for fast slow ejection is about 10 o/o higher.

We would like to thank all the MPS Staff who contributed to the completion of the ejection 62 and helped during the tests and particularly P. Collet for his help during the tests and measurements.

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Momentum	Sextupole	Bump coil	Q_{61}	Sept. magnet	Corresp. ∢	Position and ∢ of Sept. M.	
GeV/c	(A)	(A)	(A)	(A)	(mr)	mm	$\Delta\varphi$ (mr)
19	- 30	59	800	11 900	21.0	58	4.
19	- 50	82	800	11 400	20.0	60	4.
15	- 25	50	800	9 160	20.4	58	4.
15	- 38	40	630	9 400	21.1	58	4.

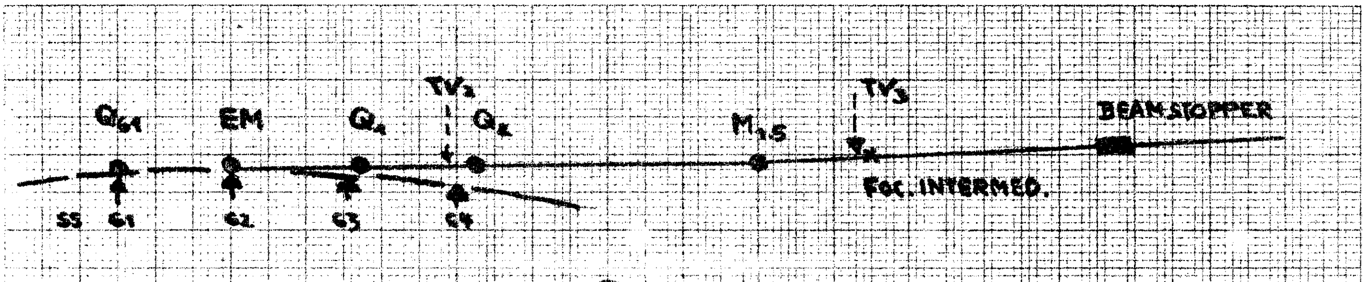

FIG.1. LAYOUT

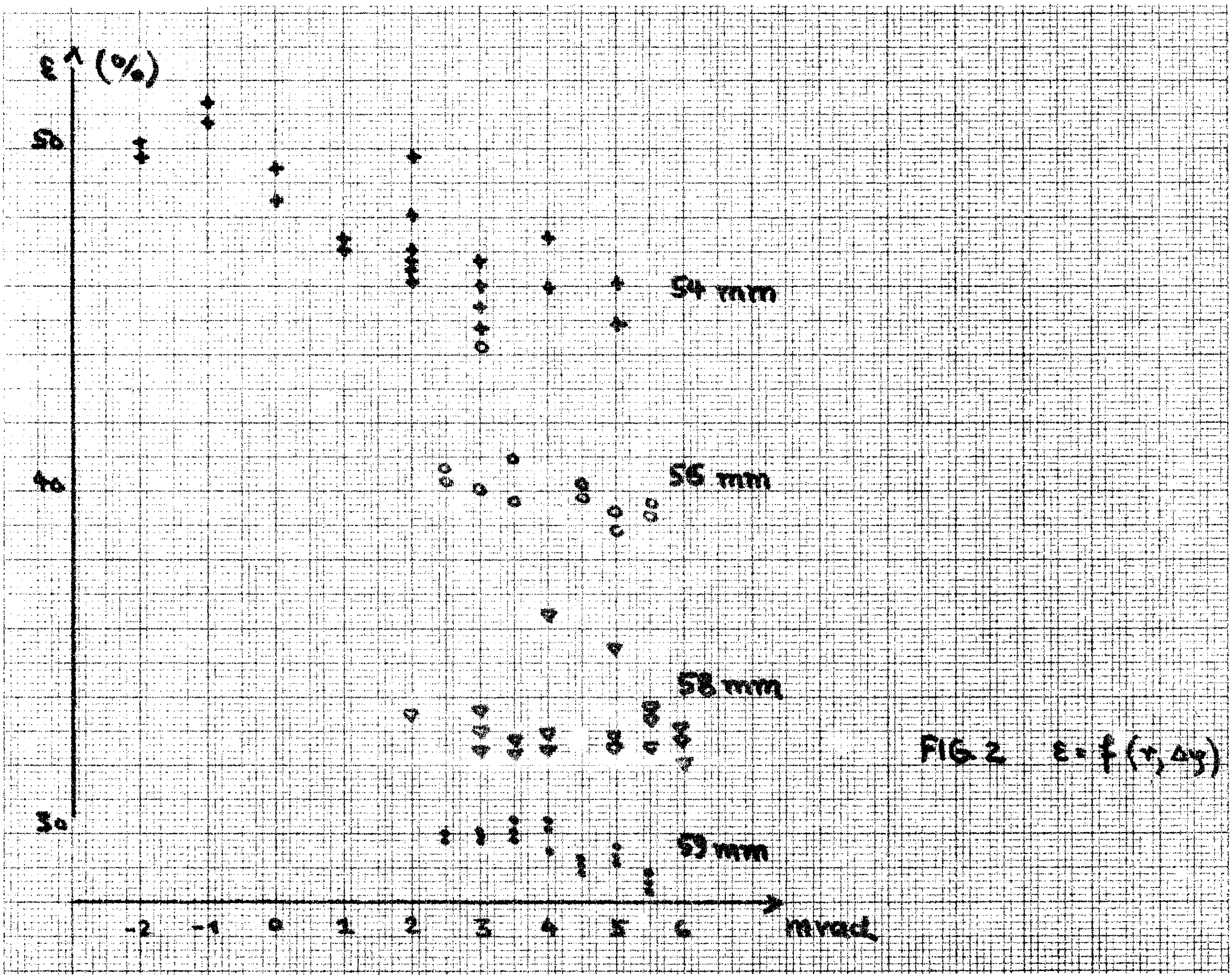

FIG.2 ε = f (r, Δy)

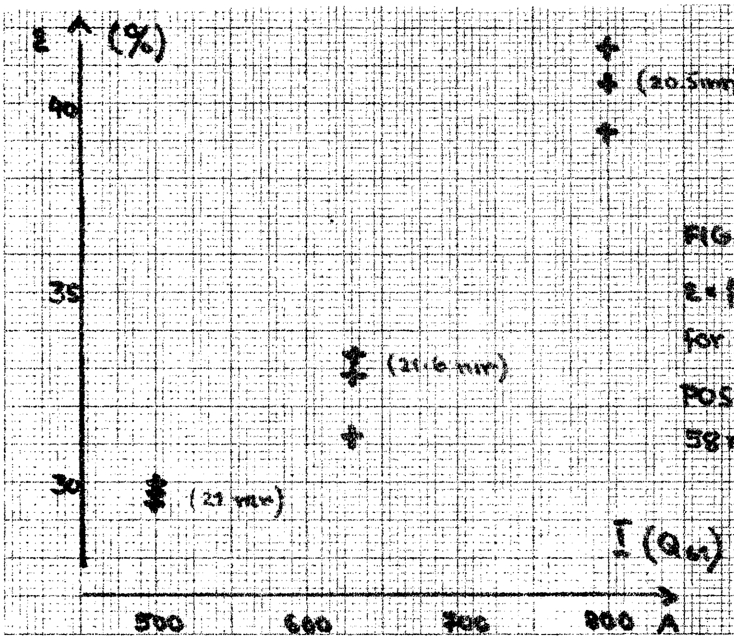

FIG.3
ε = f (I Q61)
for 15 GeV/c
POS. SEPTUM
58 mm, 4 mr.

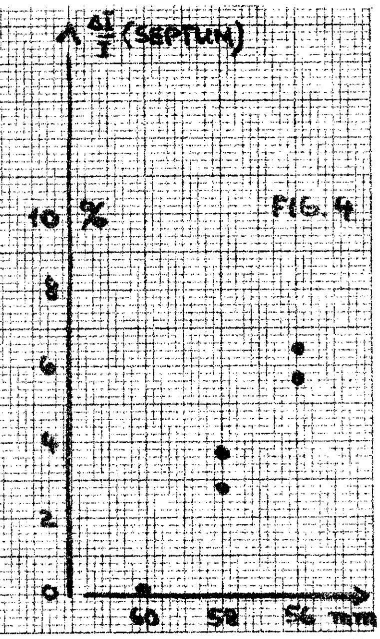

FIG.4

FABRICATION SUISSE