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REQUIRED VERTICAL BEAM APERTURE IN THE PS EJECTION SEPTUM 58

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1 Introduction

The $\bar{p}$ ejection 58 was installed in the late 1970s for the ejection of beams to the ISR (3.5 to 26 GeV/c) and SPS (26 GeV/c). Since 1984 the PS ejects $\bar{p}$ beams through this channel only at 26 GeV/c to the SPS. The same channel is now equally used to eject electron beams to the SPS at 3.5 GeV/c.

A design of a shorter septum magnet with a reduced vertical gap is presently being studied. This note discusses the vertical aperture requirements.

2 Beam sizes

Pessimistic values of beam sizes are summarized in table 1 for the three beams which are or have been ejected using ejection 58. The total beam size is assumed to be equal to 6 σ. The present vertical aperture of 25 mm in SMH58 is an aperture limit in this ejection channel.

beam	maximum E_y 10^{-6} π	β_y m	$2\sigma_y$ mm	$6\sigma_y$ mm
pbar 3.5 GeV/c	5	17	9.2	27.6
pbar 26 GeV/c	1	13	3.6	10.8
electrons	1	13	3.6	10.8

Table 1: Worst case vertical 2σ emittances and beam sizes in SMH58 for different beams

3 Conclusion

As shown in table 1, the 25 mm vertical aperture of SMH58 was rather well adapted to the case of the pre-1984 $\bar{p}$ beam at 3.5 GeV/c. If this beam is no longer required the vertical aperture may safely be reduced from 25 mm to 22.5 mm. This would still leave a 12 mm safety margin for betatron mismatch and day-to-day position fluctuations.

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