A PROPOSAL TO USE SYNCHROTRON MAGNETS IN SECONDARY BEAMS

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Introduction

It is shown that synchrotron bending magnets and quadrupoles can be used as beam transport elements in secondary beams. As these magnets are to be made in large quantities, their use in secondary beams may be very economical.

Economical Construction of Secondary Beams

The enormous expense of secondary beams at the 200-BeV accelerator dictates that considerable attention be given to constructing them in as economical a manner as possible. In the main 200-BeV ring, there are 768 large bending magnets and 180 quadrupole sections. I would propose that a few additional magnets of the type be made for use in secondary beams.

As a model for a secondary beam, I have considered a 100 BeV/c unseparated beam with an intermediate focus and with momentum recombination. This beam is shown in Fig. 1. The properties of this beam are as follows:

Dispersion	0.0062/in.	
Magnification at first focus:	1:1	V and H
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Ultimate momentum resolution:	$\Delta p/p = \pm 0.0015$.	

This can be made with counters or a 1/4 in. wide slit at the first focus.

$\Delta\Omega = 4.4 \times 10^{-7}$ sr
$\Delta p/p$ (total) = ± 0.0062

This beam will make an ample flux of particles for counter experiments. Assuming that the production cross section of π^+ at 100 BeV/c is 6 π^+/GeV/c-sr-interaction, 10^{12} interacting protons/pulse will produce 5×10^6 π^+ at the final focus. The magnet required are as follows:

8 Type B2 bending magnets operating at 14.3 kG
8 Focusing magnets 4.5 kG/in.
2 Focusing magnets 1.0 kG/in.

The power requirements of this system are quite modest, about 2 MW. At \$0.01/kWh, the cost of operating this beam is \$20/hour.

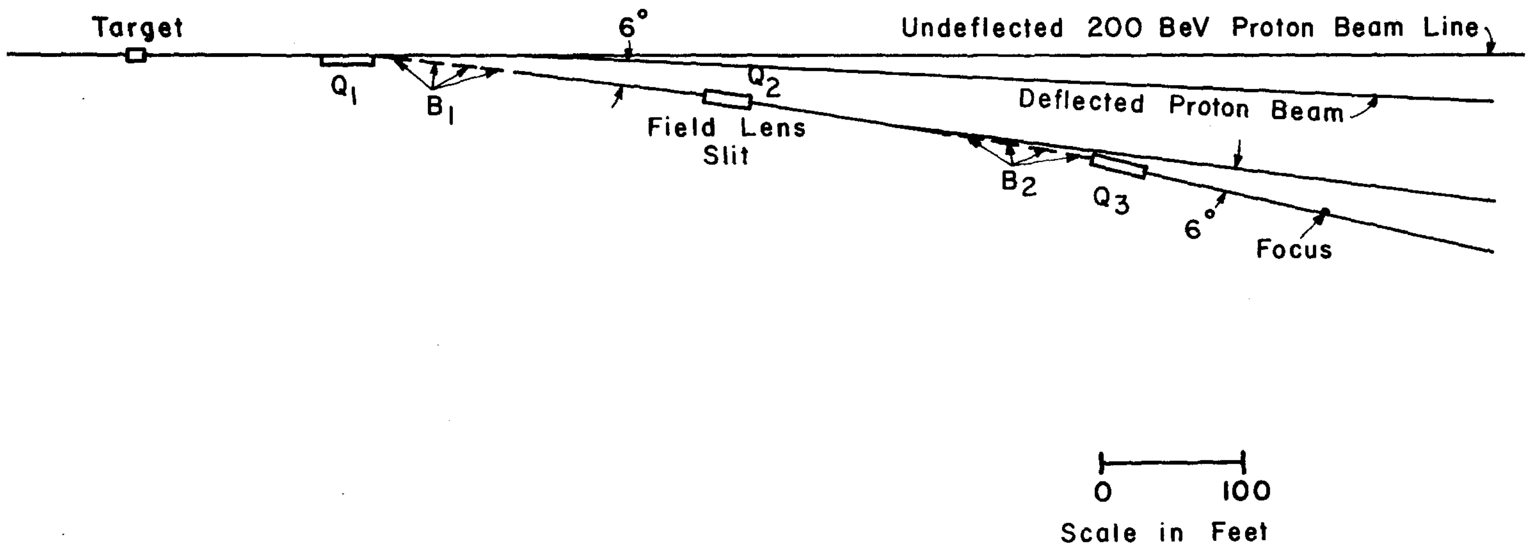

Fig. 1. Design for 100-BeV/c beam using standard synchrotron magnets. Q_1, Q_3 are quadr pole triplets using 4 synchrotron quadrupoles each; Q_2 is a field lens using two synchrotr quadrupoles. B_1 and B_2 each use four bending magnets.

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