

MR Low β^*

UPC-77



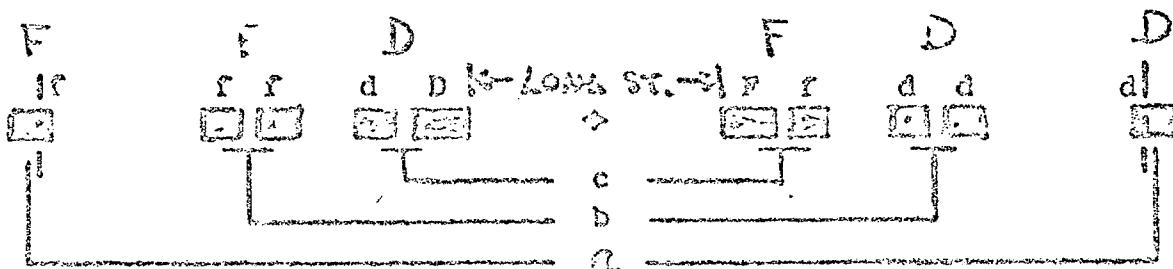
Fermilab DOWN TO $\beta^* = 2.5$ m
UP TO 150 GeV
EASY LOW-BETA FOR THE MAIN RING

TH-649
0400

T.L. Collins

March 11, 1976

The present great interest in colliding beam experiments using the main ring as one of the beams would be even greater if one could enhance the luminosity by reducing the main-ring beam size at the center of a long-straight section. For cases where the main-ring energy is less than its maximum, either flat-topped or ramping, one can indeed lower beta without additional quadrupoles by separately powering the present straight-section quads. The simplest arrangement requires three separately programmed power supplies and gives beta as low as $2\frac{1}{2}$ %, in place of the usual 70 m, in both planes. The beam size is reduced by the ratio of the square root of these numbers in each plane, and the beam density increased by the ratio, or 20 times.



A main-ring long-straight section is an anti-symmetric arrangement of quads which gives a vertical beta that is the mirror image of the horizontal beta. In the low-beta reconnection this symmetry is preserved, thus horizontal and vertical

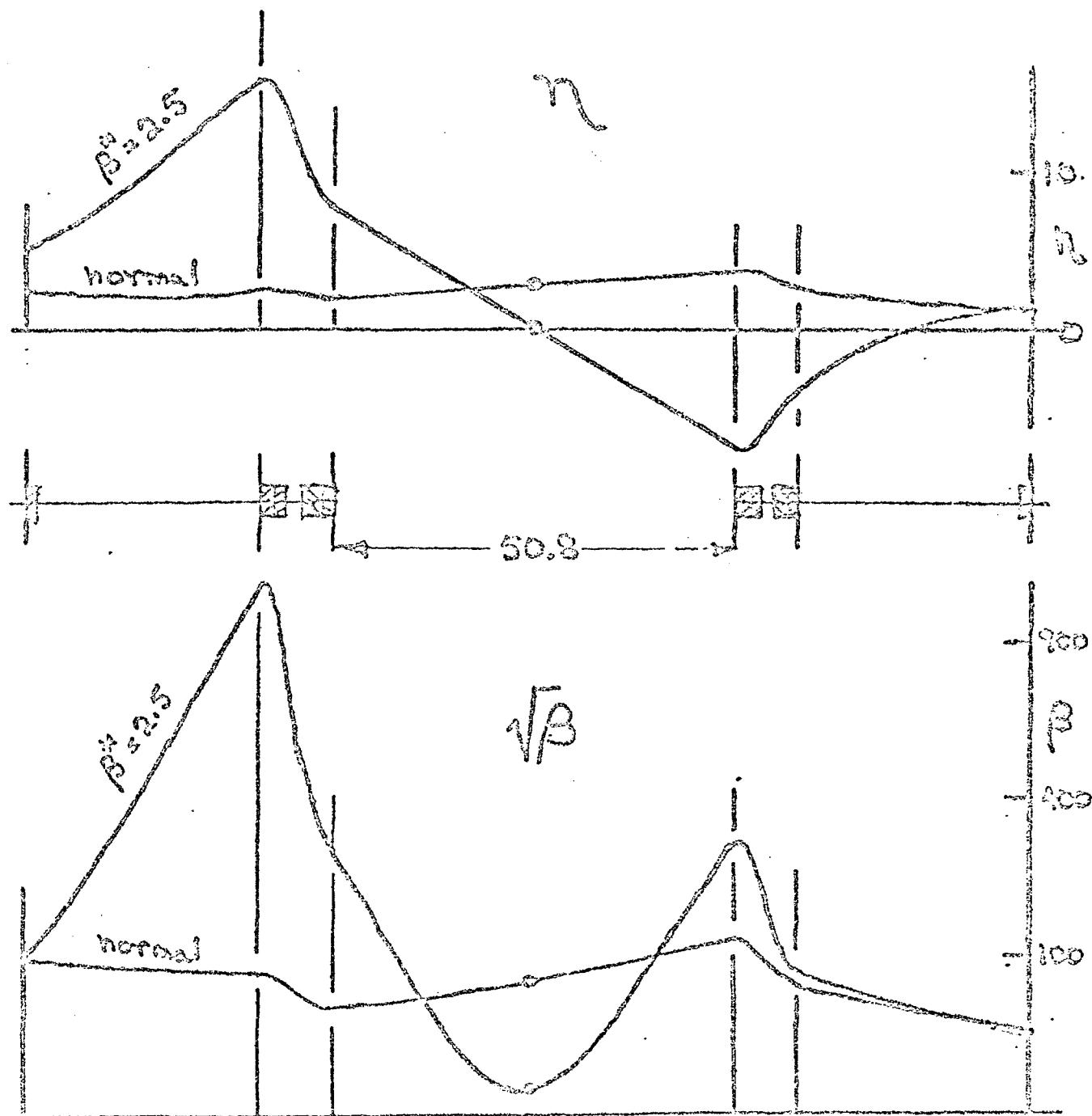


Figure 3. Beam size functions across st. sect.

COLLINS' EASY LOW β IN MAIN RING

JOHNSON DESIGN FOR ESD SIMILAR, BUT NEEDS
EXTRA QUADS. (SS-77)