

Beam Tuning with low Field Corrections

J. Herrera

January 1974

Collider Accelerator Department
Brookhaven National Laboratory

U.S. Department of Energy

USDOE Office of Science (SC)

Notice: This technical note has been authored by employees of Brookhaven Science Associates, LLC under Contract No.AT(30-1)-16 with the U.S. Department of Energy. The publisher by accepting the technical note for publication acknowledges that the United States Government retains a non-exclusive, paid-up, irrevocable, world-wide license to publish or reproduce the published form of this technical note, or allow others to do so, for United States Government purposes.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

J. Herrera, M. P. Barton

This time was spent in checking various low field corrections and tuning the beam with various combinations. First, the β -quads were set to approximately the value calculated previously (rather than arbitrarily tuned). This setting corresponds to -500 on computer display for the #2 and #8 quads and $+500$ on #12 and #18. (These polarities are, by the way, just backwards). The backleg V -shift ~~quads~~ circuits were turned off. These should no longer be needed with all the other available V -shift quads. Machine was tuned to a V -value of $V_v = 8.78$, $V_h = 8.65$. Tuned machine to about 5.5×10^{12} on early monitor and 4.3×10^{12} late. Later checked V shift from each of the β windings separately. Found $\Delta V \sim$ consistent with theory for #2's and #8's. But no consistent results with 12's & 18's. The polarity of each quadrupole should be checked and the computer displays corrected to make these all consistent.

Ran slightly different set of corrections on ~~QVC3~~ QVC3, QVF3, QVI3, QVL3. The primary role of these quads should be to correct vertical 170° gradient term. Indeed found that by returning these so that only 170° present, i.e. $QVC3 = -QVI3$, etc. no deterioration of beam resulted. However, if the beam was tuned to $V_v \approx 8.5$, and the stopband explicitly turned

with these quads, the settings are different and do not result in particularly good beam when the V value set back to reasonable value.

This study period points out the need to sort out many trivial computer system problems.

1. all polarities and circuit designations, labels, etc. must be correct and procedures established to keep them that way.
2. Service programs like DENU, LOWHN, LOWVN, etc. must be corrected, serviced, and documented.
3. There is a significant need for more equipment on the computer. These are the remainder of the low field corrections and the new pickup electrodes. The electrodes are primarily needed for closed orbit correction. There is some evidence that a closed orbit correction is overdue but the limited observations of the remaining electrodes do not permit a good job of this.