BNL-104011-2014-TECH

AGS.SN133;BNL-104011-2014-IR

To Determine Whether or Not F5 Losses Could be Reduced by Turning on No. 13 Sextupoles

D. A. Barge

July 1981

Collider Accelerator Department

Brookhaven National Laboratory

U.S. Department of Energy

USDOE Office of Science (SC)

DISCLAIMER

Number 133

AGS STUDIES REPORT

Date May 27, 1981 Time 2000-2030

Experimenters D.A. Barge and J.W. Glenn

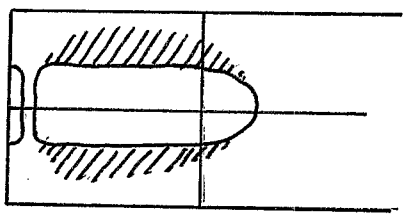
Reported by D.A. Barge

Subject To Determine Whether or Note F5 Losses Could be Reduced by Turning on No. 13 Sextupoles

OBSERVATIONS AND CONCLUSION

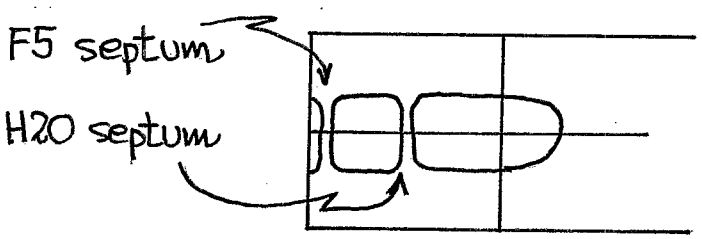
The C13 sextupoles are wired in series and the current through them is controlled by the device name SVERT on AGAST. Although the analogue current signal was not working on the crossbar multiplex system, it was evident that current was flowing through the sextupoles for the following reason. The beam intensity was appreciably degraded when the sextupoles were turned on mistimed (SVON, 2000; SVOF, 2700 milliseconds after t_o) presumably due to remanent fields in the sextupoles.

The F5 flag was inserted in the "usual" fashion, so as to just reveal the aligned shadows of the H20 and F5 septa. Relative to previous experience, a vertical halo was observed on the extracted beam.



/// = halo

In order to clearly observe the shadow of H20 (which was predicted by the BEAM program to become wider with energized No. 13 sextupoles), the HPBLW command was reduced by 20H (Hamburgers) which would then, according to expectation, move the septum shadow of H20 at F5 toward the outside of machine, which was what was observed on the unmoved F5 flag.



The sextupoles were sent a command of 1500*, but no widening of the H20 septum shadow was observed. Before attempting a polarity change on the C13's**, it was decided to increment the HPBLW (H bump) by 20H, that is, to return it to its original command and to observe the F5 losses, as seen on the CLYDE SEB EXTRACTION page.

Several "on-off tests" here, however, clearly indicated a distinct drop in F5 losses when the No. 13's were on and the COUT 10 pulse avearges were

```
*SEB EXTRACTION          27-MAY-81 19:08 02*
*                                          *
*MOM  28.272 GEV/C : SWP     0.444 %/SEC   *
*EFSP  0.407 SEC   : SPLRF   0.697         *
*                                          *
*EBM    8.12 TP: LBM    8.24 TP:RAD  -0.04"*
*SEB    7.96 TP:XEFF   96.54 % :           *
*             :XINEF    8.08 % :T/I   91.74%*
*LOSSES:                                   *
*               :F5     5.95 %:RLME   0.13 %*
*H20      1.31 %:F10    3.61 %:RLML   0.27 %*
*                                          *
*                                          *
*                                          *
*                                          *
*                                          *
*******************************************
```

Before turning on No. 13's

```
*SEB EXTRACTION          27-MAY-81 21:10 23*
*                                          *
*MOM  28.276 GEV/C : SWP     0.426 %/SEC   *
*EFSP  0.404 SEC   : SPLRF   0.744         *
*                                          *
*EBM    7.77 TP: LBM    7.83 TP:RAD  -0.03"*
*SEB    7.98 TP:XEFF 101.32 % :           *
*             :XINEF    5.22 % :T/I   97.65%*
*LOSSES:                                   *
*               :F5     3.84 %:RLME   0.11 %*
*H20      1.05 %:F10    2.46 %:RLML   0.23 %*
*                                          *
*                                          *
*                                          *
*                                          *
*                                          *
*******************************************
```

After turning on No. 13's

At 43% reeuction in F5 loss was thus observed. In addition, the RLRM ring loss plots showed an appreciable decrease in losses with the No. 13 sextupoles energized, although this was not properly documented.

A possible explanation as to why the loss monitors detected the predicted effect, and the flag did not, might be that very much lower intensity would still make the flag appear "fully illuminated". Also one of us (J.W. Glenn) has ascertained that previous attempts to energize the No. 13 sextupoles were not productive in reducing F5 losses at a different vertical tune. For this test, using calibrations of May 26, 1981, we determined that No. 17 (horizontal quads were running at 111.3 amp. The No. 3 (vertical quads) were running at 154.5 amp., whereas, the numbers used in BEAM for these quantities were, respectively, 139.9 and 161.4 amp. (accounting for scaling from field option 2).

During the next SEB run, we plan to repeat these observations with somewhat more care and in more detail.

* According to a plot made from a table of SVERT commands vs. No. 13 sextupole current as provdied by J. Funaro and R. Noble on March 13, 1981, a command of 1510 would energize the No. 13's at a level of current which was half that in the 3 drive sextupoles themselves. (drive sextupole current (-B5, +E5, +K5) = 322.3 amp., No. 13 sextupole current = 161.2 amp.). This factor of 1/2 corresponded to the somewhat arbitrary value used in BEAM for No. 13 excitation relative to drive sextupole excitation.

**As of this writing, we have no idea as to the direction of current flow in the No. 13 sextupoles, but we have some confidence that, indeed, the current flow in each magnet is in the same direction (according to M. Czaja). We intend to do direct checks at end of FEB run now in progress.