BNL-104140-2014-TECH
AGS.SN264;BNL-104140-2014-IR

Chromaticity Measurements at the AGS Booster

L. Ahrens

June 1991

Collider Accelerator Department
Brookhaven National Laboratory

U.S. Department of Energy
USDOE Office of Science (SC)

DISCLAIMER

AGS STUDIES REPORT

Date(s): 6/19, 6/26, 6/27/91 Time(s): Various

Experimenter(s): L. Ahrens and W. van Asselt

Reported by: W. van Asselt

Subject: Chromaticity Measurements at the AGS Booster

The results of chromaticity measurements during the June 1991 Booster commissioning period are presented. Table I lists values of the horizontal and vertical chromaticity as they have been derived from tune measurements for three values of the rate of change of the magnetic field.

Table I

Case	$\dot{B}$(T/s)	ξh	$\Delta\xi h$	ξv	$\Delta\xi v$
a	0.5	-1.44	0.10	-0.63	0.03
b	0.5	-1.50	0.06	-0.60	0.06
c	2.5	-1.71	0.13	-0.56	0.07
d	5.0	-1.54	0.07	-0.48	0.03

The values of the chromaticities have been obtained through a linear regression of the data. In Cases a, b, and c, the rf frequency has been used as the independent variable. In Case d, the position as measured with the IPM has been used as the independent variable. For the evaluation of the chromaticity in Case d, a dispersion of 2.1 m at the IPM has been used, which is obtained from dispersion data given in Ref. 1. Figure 1 shows an example of a measurement with the linear fits. The results from Table I have also been plotted (see Figure 2).

The results in Case a are from measurements taken on June 19 (see Pg. 39 of Ref. 2). The measurements in Case b were done during the same run with a current of 40 A in the vertical quadrupoles and after attempts to improve the horizontal difference signal. The data in Case c were measured on June 26 (Pg. 87 of

Ref. 2). Data with the IPM were recorded on June 27 (Pg. 93 of Ref. 2). Frequency measurements are available at only two of the measurement points in Case d. Using only these two points for the evaluation of the chromaticity yields 1.38 ± 0.11 and 0.49 ± 0.04 for the horizontal and vertical, respectively.

The errors in Table I all originate from inaccuracies in the tune measurements and because of the larger horizontal chromaticity and the resulting faster decoherence, they are worse in that plane.

Although the measurements presented here should not be considered conclusive, these initial results do indicate that the correction windings on the Booster dipole vacuum chamber (see Ref. 3) significantly reduce the influence of eddy currents on the chromaticity. For comparison, see Ref. 4 for similar experimental results in the AGS.

References

1. A. Luccio and M. Blaskiewicz, Booster Technical Note #19.

2. Booster Commissioning Notebook #2.

3. G.T. Danby and J.W. Jackson, PAC (1989), 384.

4. W.K. van Asselt, AGS Studies Report #206.

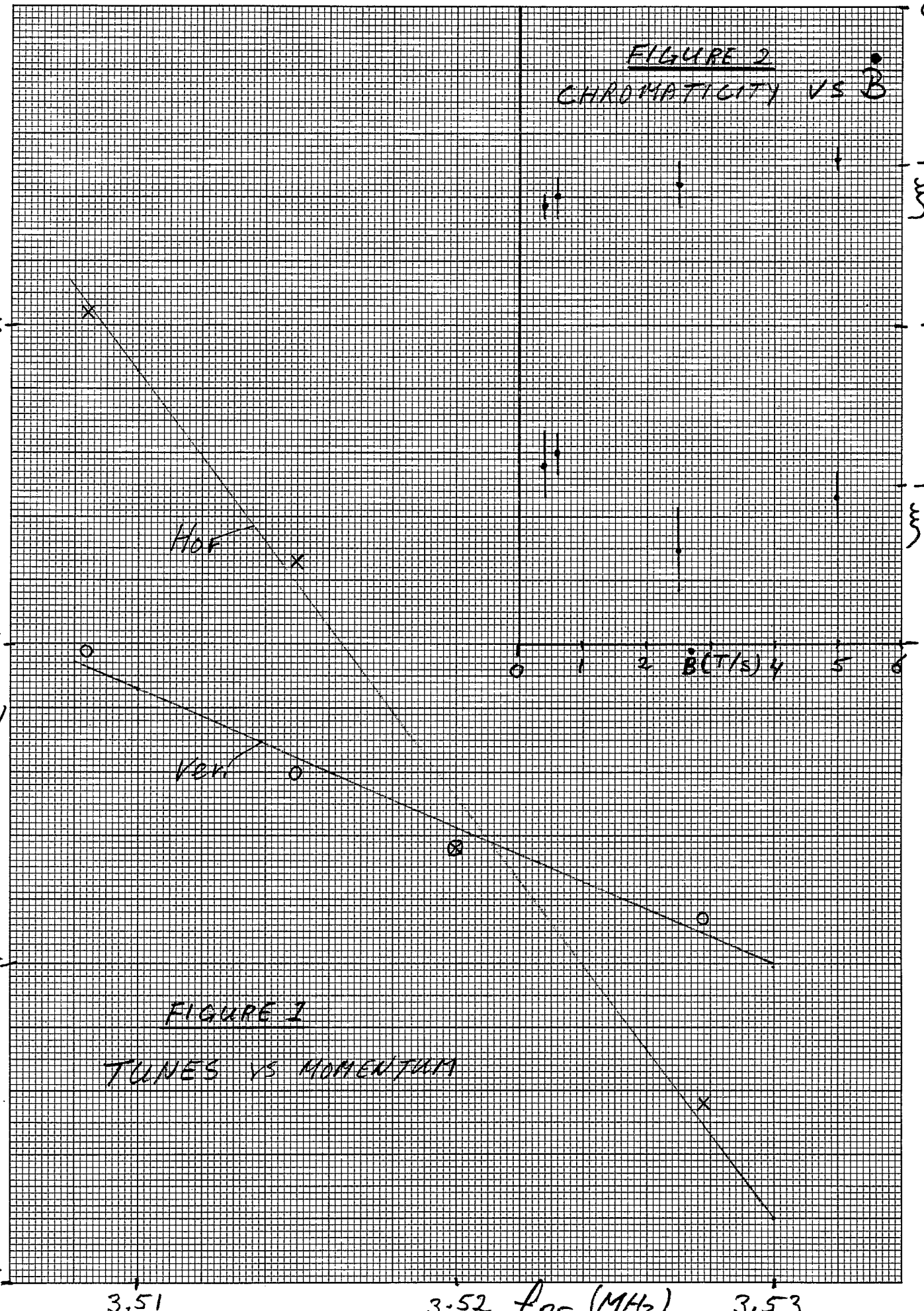

FIGURE 1

TUNES VS MOMENTUM