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Booster Parameter List with 40 kV rf Voltage

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ABSTRACT

THIS NOTE DESCRIBES THE PARAMETER LIST FOR THE AGS-BOOSTER, WITH 40 KV RF VOLTAGE FOR PROTONS; AND THE CHROMATICITY CORRECTION 1,2,4,7 SEXTUPOLE CONFIGURATION. A SCHEMATIC LAYOUT OF THE LATTICE AND ITS SUPERPERIODS ARE ALSO INCLUDED.

INTRODUCTION

This note describes the parameter list of the AGS-Booster with the 40 KV RF Voltage for protons; and tunes of 4.82 and 4.83. The chromaticity correction sextupole configuration is 1,2,4,7 and the eddy current sextupole strengths are taken to be 0.12 Tesla per meter square [1]. A schematic layout of the Booster lattice and its superperiods are also included [2-4]. In section II the present values of the Booster parameters are tabulated, [note that, the values listed are for theoretical calculations]. This updates the Booster parameter list given in Reference 5.

References:

1. Calculation of Eddy Currents, BST/TN 4, G. Morgan and S. Kahn, (January 1986).

2. Booster Lattice, Booster Tech. Note No. 1, E. Courant and Z. Parsa, (January 15, 1986).

3. Chromaticity Correction for the AGS - Booster with 1,2,4,7 Sextupole Configuration, BST/ TN 17, E. Courant and Z. Parsa, (March 5, 1986).

4. Booster Coordinates, Booster Tech. Note No. 6, Z. Parsa, (January 28, 1986).

5. AGS - Booster Parameter List, Booster Tech. Note No. 2, Z. Parsa, (January 16, 1986).

AGS BOOSTER PARAMETER LIST

ENERGY [MeV]

INJECTION:

PROTONS (INCLUDING POL PROTONS) 200 MeV

HEAVY IONS > 1 MeV/AMU

[POL == POLARIZED]

EJECTION (MAXIMUM)

PROTONS (INCLUDING POL PROTONS) 1 GeV

HEAVY IONS P = 5 Q/A GeV/AMU-C

[Q is the charge of the Heavy Ions (whether fully stripped or not) delivered from the Tandem.]

LATTICE

CIRCUMFERENCE	201.78 M (1/4 AGS)
PERIODICITY	6
NUMBER OF CELLS	24 FODO [SEPARATE FUNCTION, MISSING DIPOLS]
LENGTH	8.4075 M
PHASE ADVANCE/CELL	72.3 , 72.45
TUNES	QX= 4.82, QY= 4.83
BETAX MAX/MIN	13.865/3.5754
BETAY MAX/MIN	13.644/3.7033
XP MAX	2.9515 M
TRANSITION GAMMA	4.8812

RF SYSTEM

NUMBER OF STATIONS (3 IN TOTAL)

1 FOR PROTONS (INCLUDING POL PROTONS)
2 FOR HEAVY IONS
[where POL== POLARIZED]

HARMONIC NUMBER

3 FOR PROTONS (INCLUDING POL PROTONS)
3 FOR HEAVY IONS (1 FOR RHIC)

FREQUENCY RANGE (MHz)

FOR PROTONS (INCLUDING POL PROTONS) 2.5 - 3.9
FOR HEAVY IONS 0.178 - 2.5 (.06 - .84 FOR RHIC)

PEAK RF VOLTAGE [KV]

FOR PROTONS (INCLUDING POL PROTONS)	40
FOR HEAVY IONS	17

ACCELERATION TIME [M-SEC]

FOR PROTONS (INCLUDING POL PROTONS)	50
FOR HEAVY IONS	500

REPETITION RATE

FOR PROTONS	10 Hz	(4 PULSES/AGS PULSE)
FOR POL PROTONS	1 Hz	(1 PULSE/AGS PULSE)
FOR HEAVY IONS	1 Hz	(1 PULSE/AGS PULSE)

DIPOLES

[DIPOLES ARE CURVED AND WEDGED FOR 0 ENTRANCE ANGLE]

NUMBER	36
LENGTH (MAGNETIC)	2.4 M
GAP	82.55 MM
GAP VACUUM CHAMBER	66 MM
GOOD FIELD REGION ($<10^{-4}$)	16 X 6.6 CM

INJECTION FIELD [KG]

FOR PROTONS (INCLUDING POL PROTONS) 1.5633
FOR HEAVY IONS 0.1047 A/Q

EJECTION FIELD [KG]

FOR PROTONS (INCLUDING POL PROTONS) 4.1049
FOR HEAVY IONS 12.129

LAMINATION THICKNESS 1.5 MM
[0.6 MM AROUND ENDS]

QUADRUPOLES

NUMBER 48

LENGTH (MAGNETIC) 0.50375 M

APERTURE 16.52 CM

VACUUM CHAMBER AP. 15.5 CM
[AP.== APERTURE]

WITH GF = 11.999 [KG/M] , GD = 12.369 [KG/M]

INJECTION POLE TIP FIELD [KG]

FOR PROTONS (INCLUDING POL PROTONS)

BF = 0.98992 , BD = 1.0204

FOR HEAVY IONS

BF = 0.06635 A/Q , BD = 0.0683 A/Q

EJECTION POLE TIP FIELD [KG]

FOR PROTONS (INCLUDING POL PROTONS)

BF = 2.5994 , BD = 2.6795

FOR HEAVY IONS

BF = 7.6805 , BD = 7.917

LAMINATION THICKNESS 0.6 MM

FIELD QUALITY

SEXTUPOLE HARMONIC 0.0

(6 THETA/2 THETA) (SHAPE POLE TIP TO ELIMINATE)

ALL OTHER HARMONICS $< 10^{-4}$

MAX. VACUUM PRESSURE (N2 EQU.) 3×10^{-11} TORR

MAX. INTENSITY (PARTICLES PER PULSE)

FOR PROTONS	$1 - 3 \times 10^{13}$
FOR POL PROTONS	10^{12}
FOR HEAVY IONS	10^{11} A/ Q^2

SEXTUPOLES

LOCATION	1,7 (SF), 2,4 (SD)
NUMBER	24 (12 SF + 12 SD)
LENGTH	10 CM
APERTURE	16.52 CM

AT 1 GEV WITH INTEGRATED STRENGTH [T/M]: 1.761

INJECTION POLE TIP FIELD [KG]

FOR PROTONS (INCLUDING POL PROTONS)	0.45761
FOR HEAVY IONS	0.03065 A/Q

EJECTION POLE TIP FIELD [KG]

FOR PROTONS (INCLUDING POL PROTONS)	1.2015
FOR HEAVY IONS	3.5504

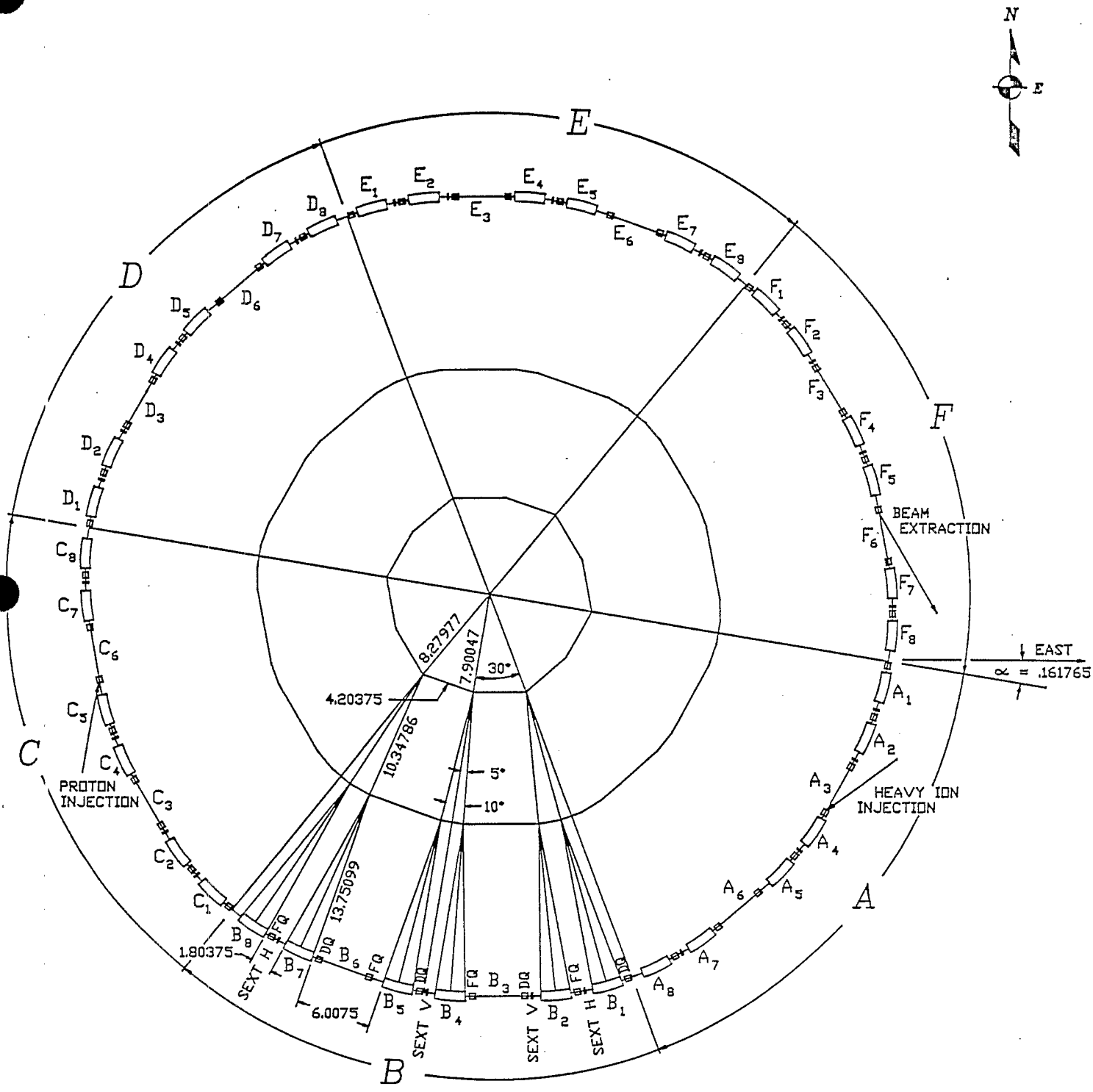

Fig. 1 The Booster Lattice

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METERS
NOTE: ALL DIMENSIONS ARE IN METERS

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