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Booster Parameter List with 1,2,4,7 Sextupole Configurations

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ABSTRACT

THIS NOTE DESCRIBES THE PARAMETER LIST FOR THE AGS - BOOSTER, WITH SEXTUPOLE CONFIGURATIONS 1,2,4,7. A SCHEMATIC LAYOUT OF THE LATTICE AND ITS SUPERPERIODS ARE ALSO INCLUDED.

INTRODUCTION

This note describes the parameter list of the AGS - Booster with 1,2,4,7 sextupole configurations and tunes of 4.82 and 4.83. In section II the present values of the Booster parameters are tabulated. The values listed are for theoretical calculations and are "precise but may not be accurate". This updates the Booster parameter list given in Reference 1. Schematic diagrams of the lattice [2,3] showing the layout of the AGS Booster, the labling convention of the lattice and its superperiods are also included.

References:

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

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

3. Booster Coordinates, Booster Tech. Note No. 6, Z. Parsa, (January 28, 1986). See also, BST/ TN NO. 3, Z. Parsa, G. F. Dell, (January 17, 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)	35
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.) 10^{-10} TORR

MAX. INTENSITY (PARTICLES PER PULSE)

FOR PROTONS $1 - 1.5 \times 10^{13}$

FOR POL PROTONS 10^{12}

FOR HEAVY IONS $2 \times 10^{11} / Z$

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]:	1.7	1.761
INJECTION POLE TIP FIELD [KG]		
FOR PROTONS (INCLUDING POL PROTONS)	0.44139	0.45761
FOR HEAVY IONS	0.02956 A/Q	0.03065 A/Q
EJECTION POLE TIP FIELD [KG]		
FOR PROTONS (INCLUDING POL PROTONS)	1.159	1.2015
FOR HEAVY IONS	3.4246	3.5504

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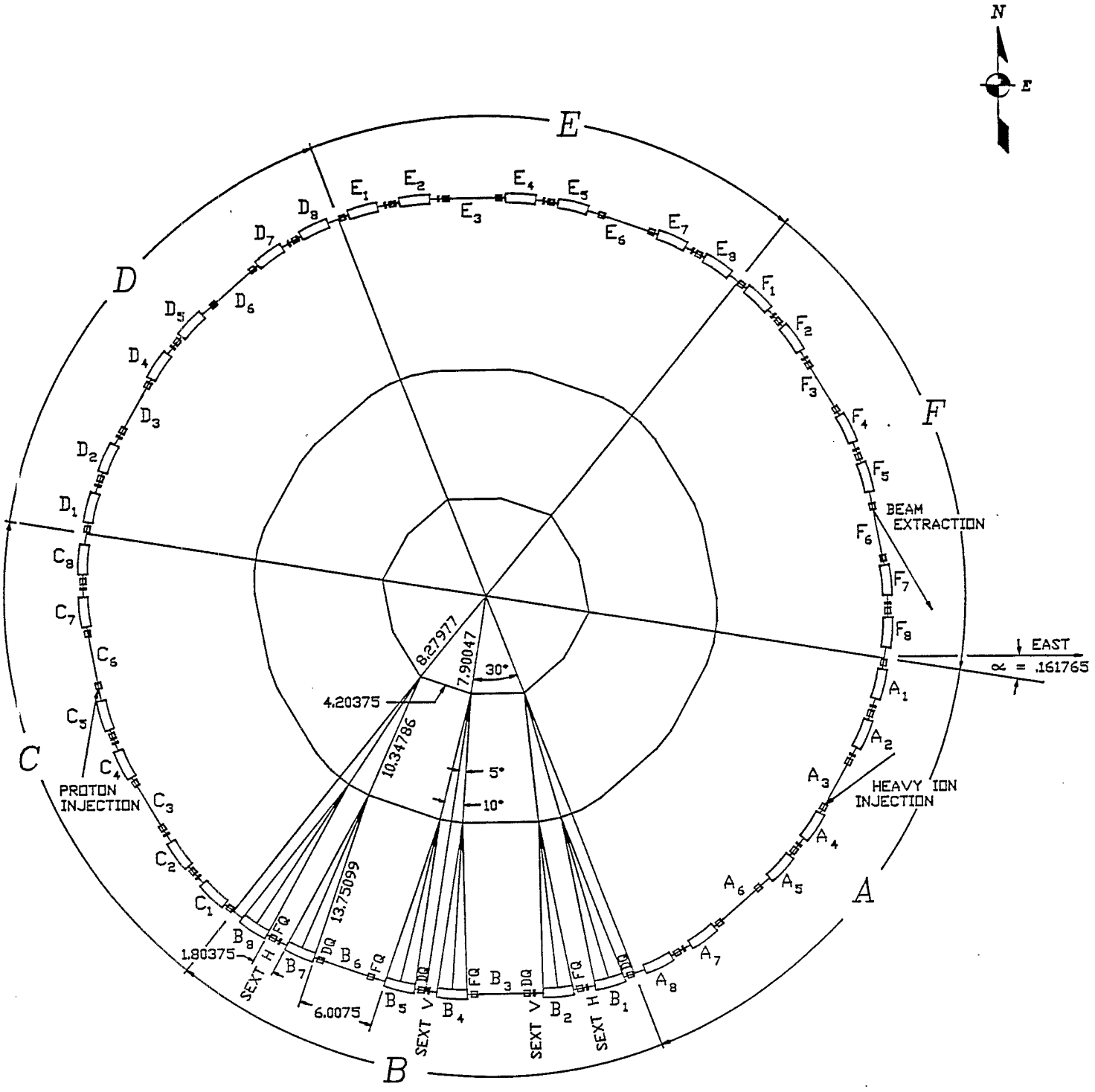

Fig. 1 The Booster Lattice