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Booster Parameter List eith Enlarged Q5

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DISCLAIMER

BOOSTER PARAMETER LIST

WITH ENLARGED Q5

Booster Technical Note

No. 25

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HIGH ENERGY FACILITIES

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ABSTRACT

THIS NOTE DESCRIBES THE PARAMETER LIST FOR THE AGS-BOOSTER, WITH THE INCREASED SIZE OF GOOD FIELD APERTURE FOR Q5 AND THE CHROMATICITY CORRECTION 1,2,4,7 SEXTUPOLE CONFIGURATION. A SCHEMATIC LAYOUT OF THE LATTICE AND ITS SUPER-PERIODS ARE ALSO INCLUDED.

INTRODUCTION

This note describes the parameter list of the AGS-Booster with the increased size of good field aperture for Q5. A 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); and BST/TN 20, Z. Parsa, (March 10, 1986).

AGS BOOSTER PARAMETER LIST

LATTICE

CIRCUMFERENCE	201.78 m (1/4 AGS)
PERIODICITY	6
NUMBER OF CELLS	24 FODO
LENGTH	8.4075 m
PHASE ADVANCE/CELL	72.3 , 72.45 [degrees]
TUNES	QX= 4.82, QY= 4.83
BETAX MAX/MIN	14.082/3.545
BETAY MAX/MIN	13.699/3.678
XP MAX	2.864 m
TRANSITION GAMMA	4.8647

ENERGY [MeV]	@ INJECTION	@ EJECTION
PROTONS	200 MeV [BRHO=21.4962 kG-m]	1 GeV [BRHO=56.446 kG-m]
HEAVY IONS	1 MeV/AMU [BRHO=1.4403A/Q kG-m]	P=5Q/A GeV/AMU-C [BRHO=166.783 kG-m]

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

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	(0.7 M) *
APERTURE	16.52 CM	(23.13 CM)
VACUUM CHAMBER AP. [AP.== APERTURE]	HORIZ. 15.25 CM *	VERT. 5 CM

WITH GF = 12.032 [KG/M] (8.594)
GD = -12.387 [KG/M]

[* SPECIAL QUADRUPOLE (Q5) FOR INJECTION.]

INJECTION POLE TIP FIELD [KG]
FOR PROTONS (INCLUDING POL PROTONS)
BF =0.9938, BD =1.0232
FOR HEAVY IONS
BF = 0.06659 A/Q , BD = 0.06856 A/Q

EJECTION POLE TIP FIELD [KG]
FOR PROTONS (INCLUDING POL PROTONS)
BF = 2.6096, BD = 2.6868

FOR HEAVY IONS
BF = 7.70573 , BD = 7.9337

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

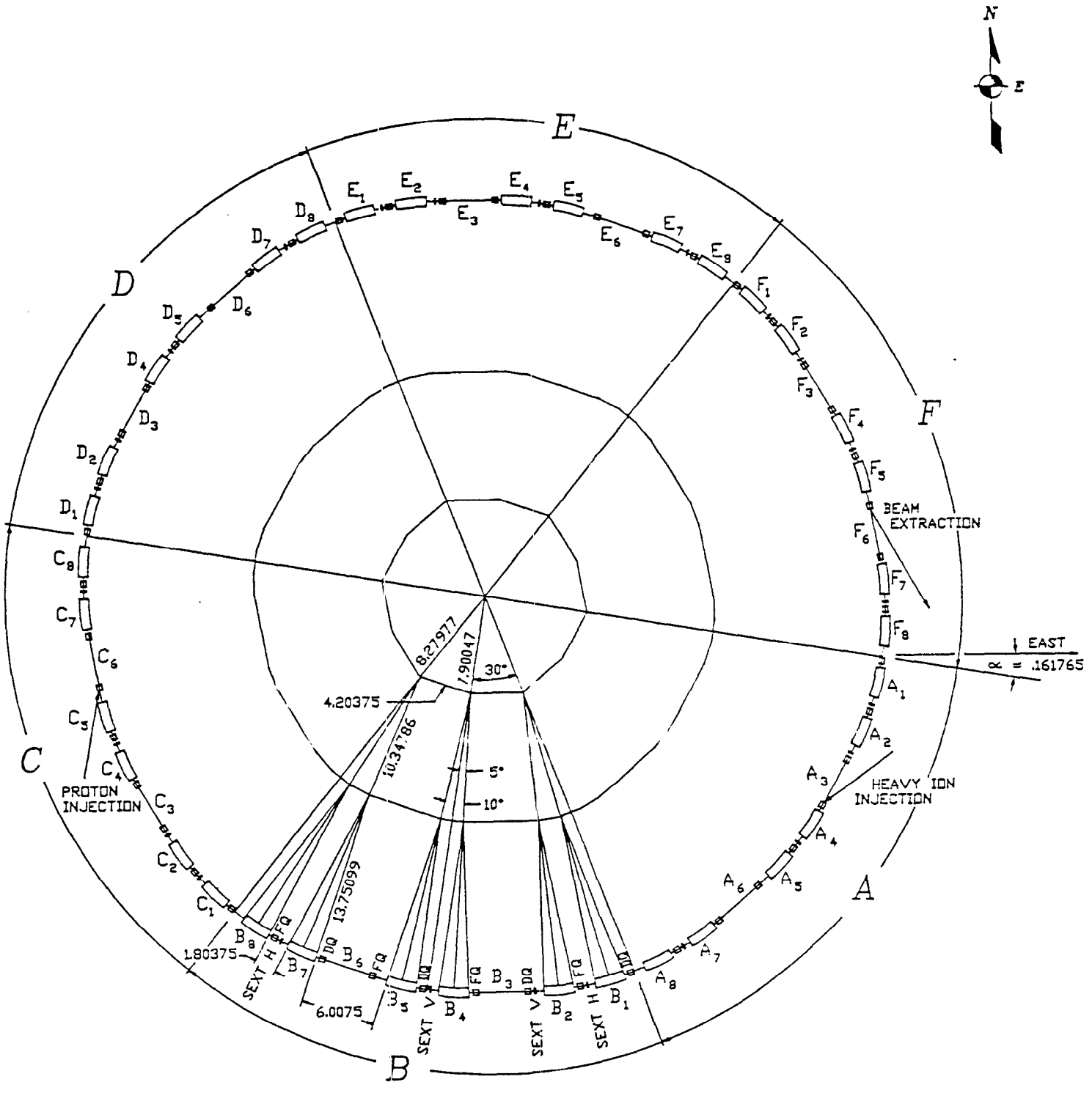

Fig. 1 The Booster Lattice