

Booster Parameter List eith Enlarged Q5

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BOOSTER PARAMETER LIST

WITH ENLARGED Q5

Booster Technical Note

No. 25

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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 SUPERPERIODS 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
 -4
 GOOD FIELD REGION (<10) 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. HORIZ. VERT.
 [AP.== APERTURE] 15.25 CM 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)
 -4
 ALL OTHER HARMONICS < 10
 -11
 MAX. VACUUM PRESSURE (N2 EQU.) 3 x 10 TORR

 MAX. INTENSITY (PARTICLES PER PULSE)

----- 13
 FOR PROTONS 1 - 3 x 10
 12
 FOR POL PROTONS 10
 11 2
 FOR HEAVY IONS 10 A/ Q

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

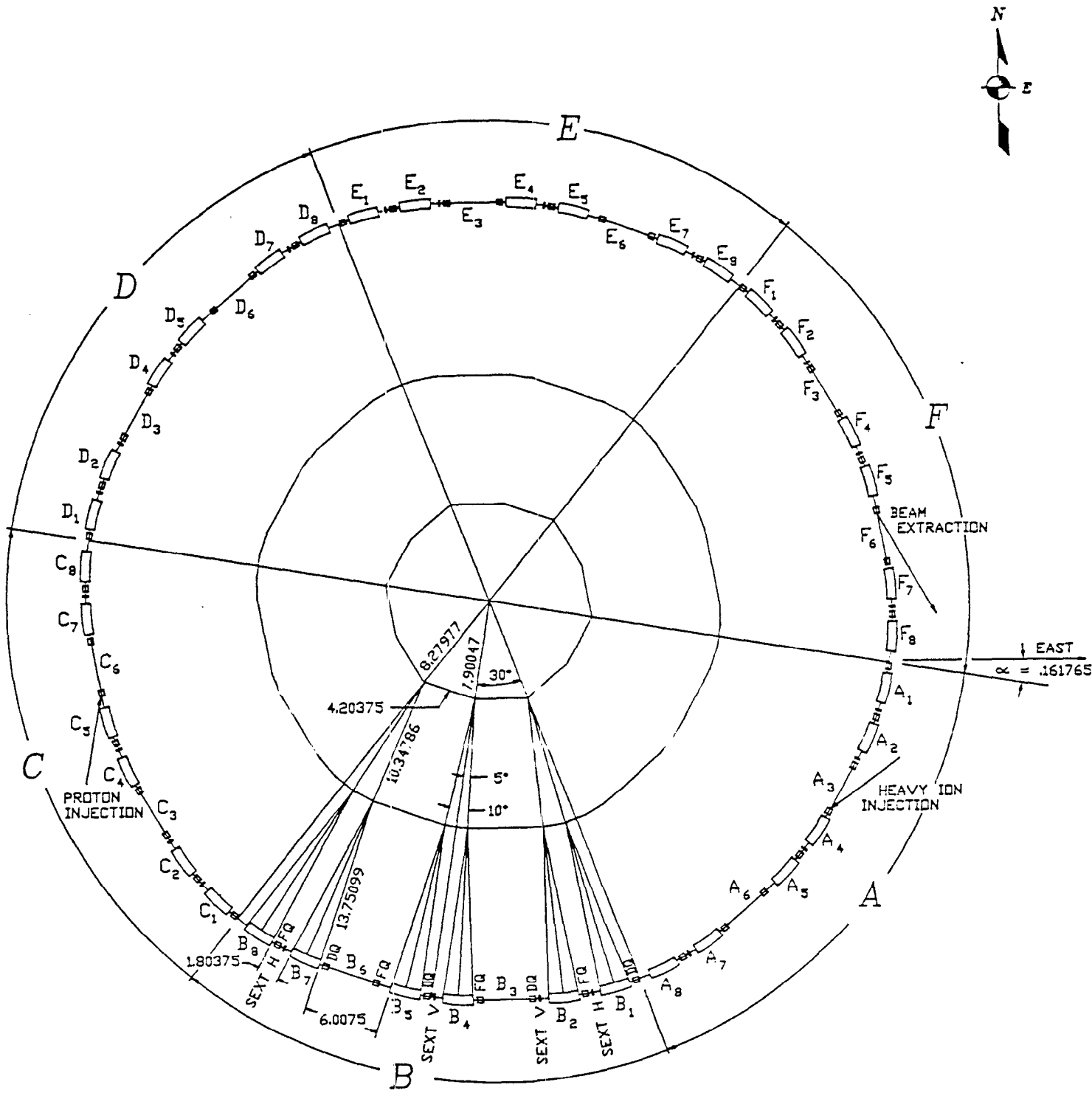


Fig. 1 The Booster Lattice

0 5
METERS
NOTE: ALL DIMENSIONS ARE IN METERS