

## Booster Parameter List eith Enlarged Q5

Z. Parsa

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Collider Accelerator Department  
**Brookhaven National Laboratory**

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# *BOOSTER PARAMETER LIST*

WITH ENLARGED Q5

*Booster Technical Note  
No. 25*

Z. PARSA

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*HIGH ENERGY FACILITIES  
Brookhaven National Laboratory  
Upton, N.Y. 11973*

## 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

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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.

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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               | 1 GeV               |
|  | [BRHO=21.4962 kG-m]   | [BRHO=56.446 kG-m]  |
| HEAVY IONS   | 1 MeV/AMU             | P=5Q/A GeV/AMU-C    |
|  | [BRHO=1.4403A/Q kG-m] | [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



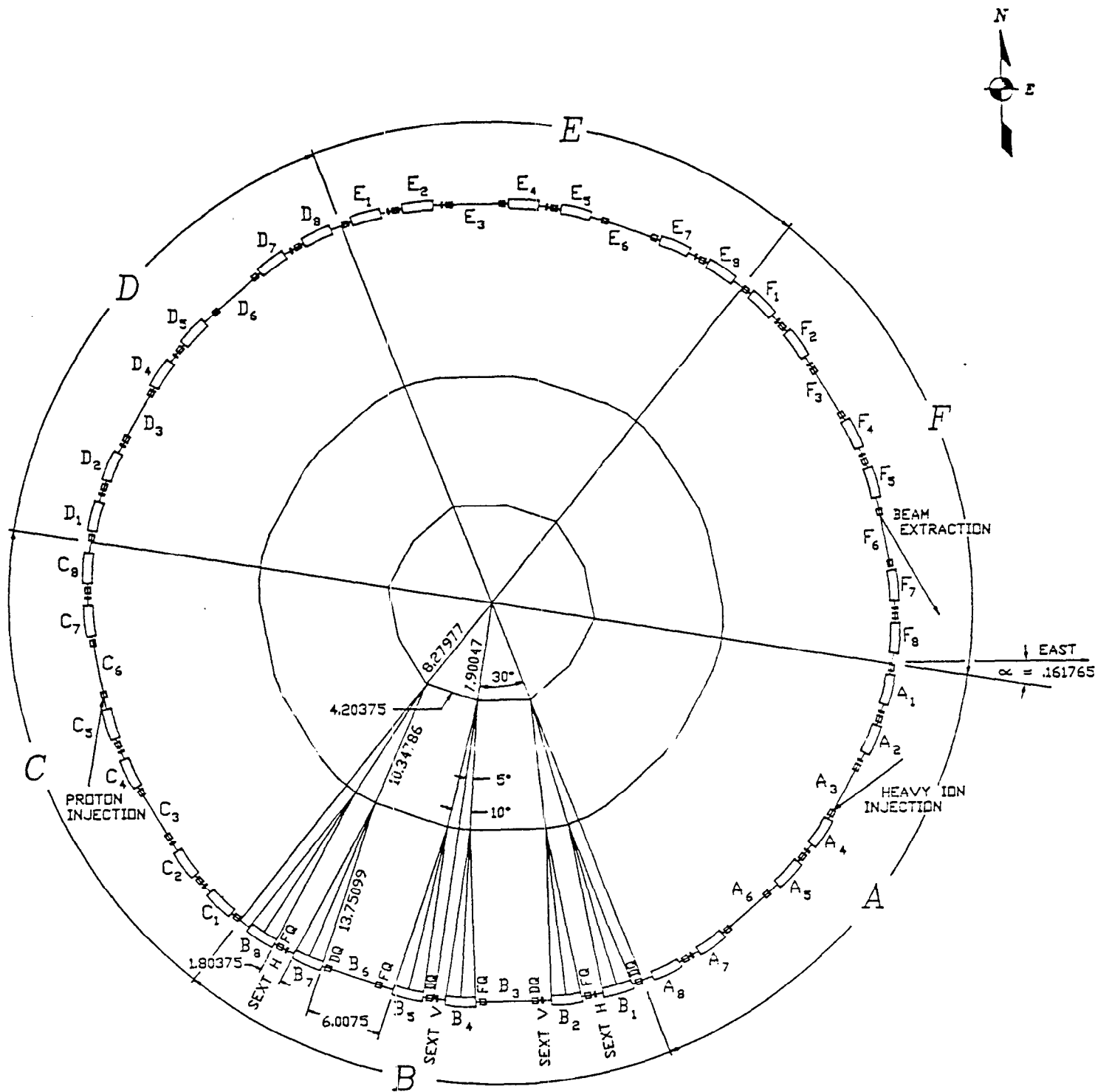


Fig. 1 The Booster Lattice

0 5  
METERS  
NOTE: ALL DIMENSIONS ARE IN METERS