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# Booster Parameter List with 40 Kv RF Voltage

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USDOE Office of Science (SC)

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# BOOSTER PARAMETER LIST

WITH 40 KV RF VOLTAGE

Booster Technical Note

No. 2[illegible]

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HIGH ENERGY FACILITIES

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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.

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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).

# 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
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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.) $3 \times 10^{-11}$ 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 |

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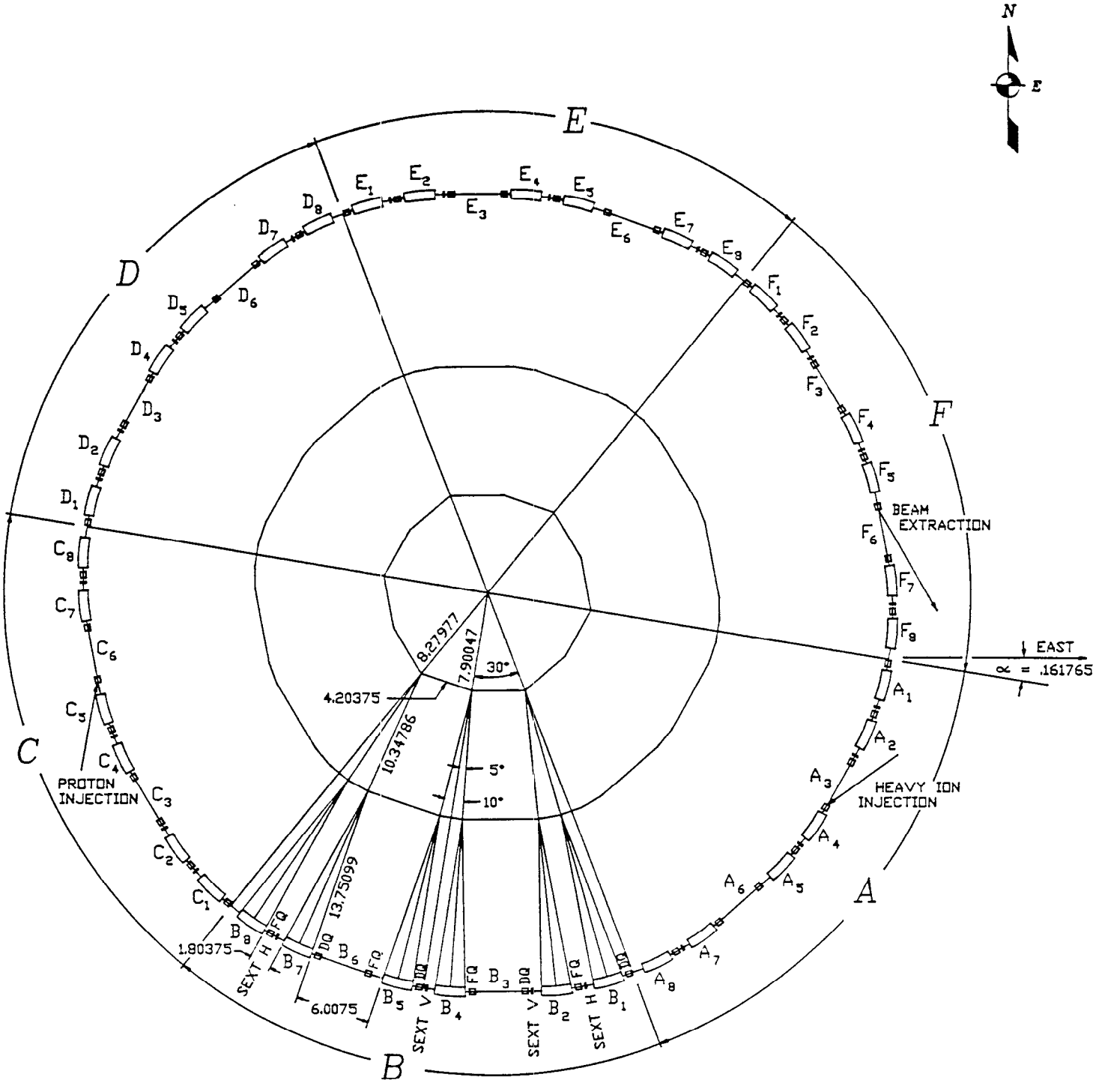


Fig. 1 The Booster Lattice