



BNL-105067-2014-TECH

Booster Technical Note No. 20;BNL-105067-2014-IR

Booster Parameter List with 40 Kv RF Voltage

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March 1986

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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. 20

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MARCH 10, 1966

HIGH ENERGY FACILITIES
Brookhaven National Laboratory

U. S. GOVERNMENT PRINTING OFFICE: 1967

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 SEXTU-POLE 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.

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
⁻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
 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.) 3×10^{-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

ACKNOWLEDGEMENT:

We acknowledge the efforts of E. Courant, members of the Booster Design study group, and R. Alvino's assistance.

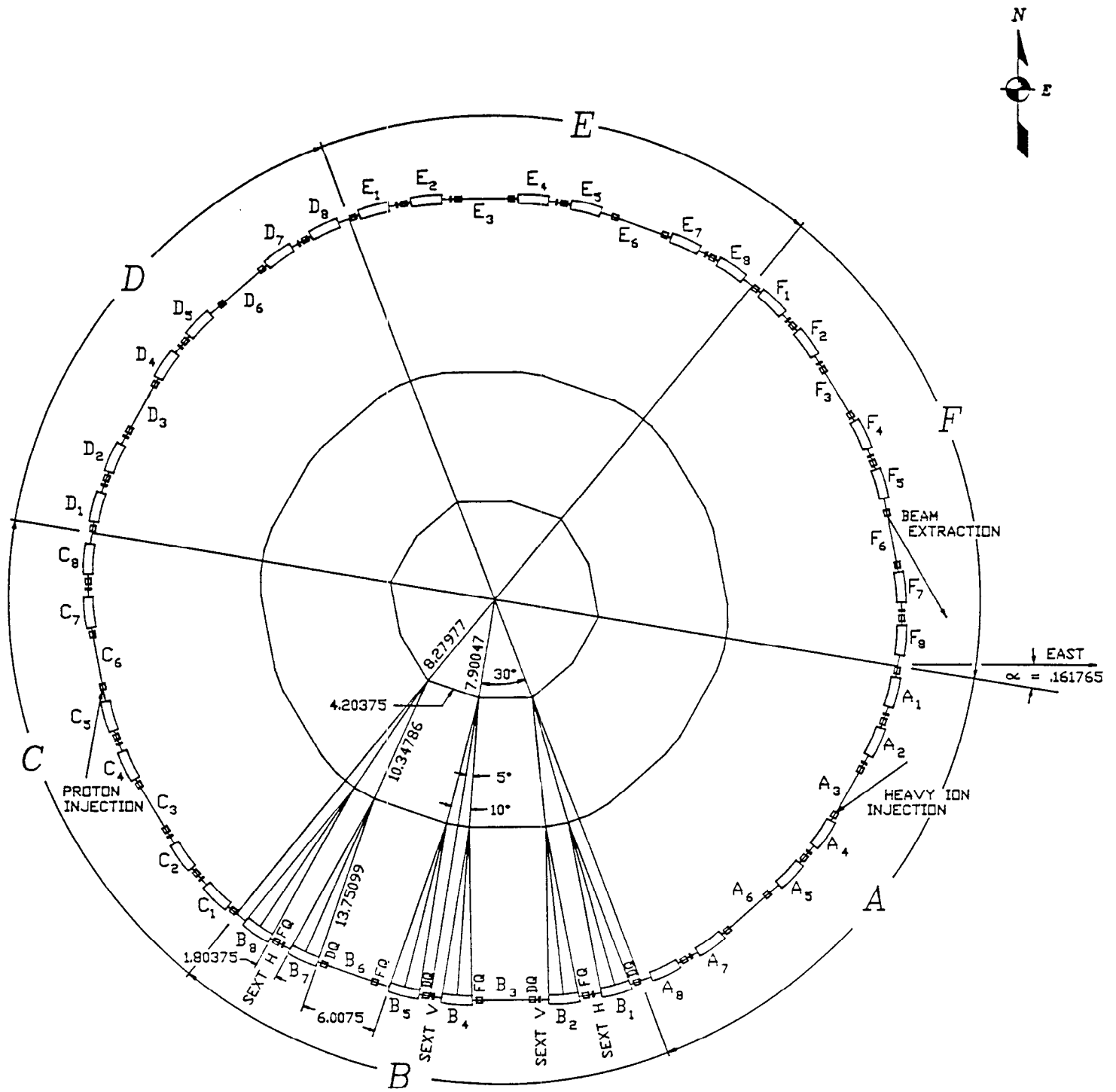


Fig. 1 The Booster Lattice

0 5
METERS

NOTE: ALL DIMENSIONS ARE IN METERS