

ENTRY NO. C67 Date OCTOBER, 1995
 Name of Machine HARPER HOSPITAL K100 (BUILT AT NATIONAL SUPERCONDUCTING CYCLOTRON LAB, E. LANSING, MI)
 Institution GERSHENSON RADIATION ONCOLOGY CENTER, HARPER HOSPITAL
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 In Charge: R.L. MAUGHAN Reported by: R.L. MAUGHAN

HISTORY

MILESTONE DATES:

Design 81-84 Model Tests 83-85
 Construction 84-89 First Beam APRIL 1989
 DESIGN/CONSTRUCTION BY:
 in house NO other NSCL, MSU, E. LANSING, MI
 COST: Accelerator 2,000,000 US Facility 5,000,000 US
 FUNDED BY: HARPER HOSPITAL, INC

STATUS

STAFF: Machine

Scientists 1 Engineers 2
 Technicians 1 Students
 Research (in house/external)
 Scientists 1 / - Engineers - / -
 Technicians 1 / - Students / -
 BUDGET: Machine \$400,000 US Funded by HARPER HOSP.
 Research \$300,000 US Funded by WAYNE STATE UNIV.

TIME DISTRIBUTION:

Basic Research (in house/external) 10 % / - %
 Applied Program (in house/external) 70 % / - %
 Maintenance 15 % Development 5 %

MAGNET

POLE PARAMETERS:

Diameter cm R_{extract} 30 cm R_{inject} - cm

HILL PARAMETERS: Gap (min) 3.8 cm B_{max} 55.3 T

(@ AT) Gap (max) cm B_{min} T

VALLEY PARAMETERS: Gap (min) 40.6 cm B_{max} 40.7 T

(@ AT) Gap (max) cm B_{min} T

AVERAGE FIELD: $\langle B \rangle_{\text{min}}$ T $\langle B \rangle_{\text{max}}$ T

NUMBER OF SECTORS: compact/separated 3 /

sector angle deg. spiral (max) deg.

FIELD TRIMMING: Trim Coils NONE

Harmonic Coils NONE

Other

CURRENT: Main Coils 203 Amps Stability 5×10^{-5}

Trim Coils Amps Stability

Stored Energy (cryogenic) 2.0 MJ

WEIGHT: Iron 24 US TONS Conductor NbTi IN CU

ION ENERGY: Bending Limit E/A = 100 $\text{q}^2/\text{A}^2 \text{ MeV/u}$

Focusing Limit E/A = 50 q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:

Description: 3-DEE/6 STEM DEES GALVANICALLY COUPLED

No. of Gaps/turn 3.6 dE/dn(max) 200 MeV/q

Voltage (max) 0.033 MV Harmonic f_H/f_{ion} 3

Freq 105,000 MHz Power in(max) 0.025 MW

Stability: Phase Voltage

OTHER CAVITIES (Flattopping or otherwise):

Description:

Region of Influence: R_{min} cm R_{max} cm

No. of Gaps/turn dE/dn(max) MeV/q

Voltage (max) MV Harmonic f_H/f_{ion}

Freq MHz Power in(max) MW

Stability: Phase Voltage

VACUUM SYSTEM

OPERATING PRESSURE: 1×10^{-5}

PUMPS: (No. and type) 2 TURBO

300 liter/SEC

ION SOURCE(S)

Type	Intensity (mA)	@	$\epsilon_n = \beta\gamma\epsilon$ ($\pi \text{ mm mrad}$)	Ion Species
(a) COLD CATHODE	-	-	-	d
(b)	-	-	-	-
(c)	-	-	-	-
(d)	-	-	-	-

INJECTION SYSTEM

Efficiency %

EXTRACTION SYSTEM

Efficiency %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μA)
		Internal External
(a) DEUTERON	24.25	15 -
(b) BEAM R-F IS PULSED 2MS ON. 8 MS OFF	-	-
(c) PEAK BEAM DURING PULSE 180 microamps.	-	-
(d)	-	-

Secondary Particles	E (MeV)	part/sec
(a) NEUTRON	(21)	48 cGy/MIN
(b) (BERYLLIUM STOPPING TARGET)	-	FLATTENED
(c)	-	-

EXTRACTED BEAM PROPERTIES:

For μA of MeV/u ions

$\Delta E/E$ % $\Delta\phi$ °rf

$\epsilon_n = \beta\gamma\epsilon$ x $\pi \text{ mm mrad}$ z $\pi \text{ mm mrad}$

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed: 47 m^2 Moveable NONE m^2

Target Stations: 1 No. Served At Same Time: 1

MAGNETIC SPECTROMETERS: NONE

OTHER FACILITIES: ISOCENTRIC GANTRY, VARIABLE

MULTI-ROD COLLIMATOR SYSTEM FOR NEUTRON

RADIATION THERAPY

REFERENCES/NOTES

(a) IEEE TRANS. ON NUCL. SCI. NS-32 (1985) 3287

(b) MAUGHAN, POWERS, BLOSSER. MED. PHYS. 21 (1994) 779

PLAN VIEW OF FACILITY, COMMENTS