

ENTRY NO. C66 Date JULY 1992
 Name of Machine HARPER HOSPITAL K100 (BUILT AT NATIONAL SUPERCONDUCTING CYCLOTRON LAB., E., LANSING)
 Institution GERSHENSON RADIATION ONCOLOGY CENTER, HARPER HOSPITAL
 Address 3990 JOHN R., DETROIT, MI 48201, U.S.A.
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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
 COST: Accelerator \$2,000,000 Facility \$5,000,000 U.S.
 FUNDED BY: HARPER HOSPITAL, INC.

STATUS

STAFF: Machine
 Scientists 1 Engineers 2
 Technicians 1 Students _____
 Research (in house/external)
 Scientists 1 / _____ Engineers 2 / _____
 Technicians 1 / _____ Students _____ / _____
 BUDGET: Machine \$400,000 U.S. Funded by HARPER HOSP.
 Research \$60,000 U.S. Funded by VARIOUS
 TIME DISTRIBUTION:
 Basic Research (in house/external) 10 % / _____ %
 Applied Program (in house/external) 70 % / _____ %
 Development 15 % Maintenance 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
 (θ _____ AT) Gap (max) _____ cm B_{min} _____ T
 VALLEY PARAMETERS: Gap (min) 40.6 cm B_{max} 40.7 T
 (θ _____ AT) Gap (max) _____ cm B_{min} _____ T
 AVERAGE FIELD: $\langle B \rangle_{min}$ _____ T $\langle B \rangle_{max}$ _____ 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 X 10⁻⁵
 Trim Coils _____ Amps Stability _____
 Stored Energy (cryogenic) 2.0 MJ
 WEIGHT: Iron 24 TONS. Conductor NATL. IN. CU.
 ION ENERGY: Bending Limit $E/A =$ 100 q²/A² MeV/u
 Focussing 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_{rf}/f_{ion} 3
 Freq 105,000.0 MHz Power in(max) 0.025 MW
 Stability: Phase _____ Voltage _____
 OTHER CAVITIES (Flattopping or otherwise):
 Description: NONE
 Region of Influence: R_{min} _____ cm R_{max} _____ cm
 No. of Gaps/turn _____ $dE/dn(max)$ _____ MeV/q
 Voltage(max) _____ MV Harmonic f_{rf}/f_{ion} _____
 Freq _____ MHz Power in(max) _____ MW
 Stability: Phase _____ Voltage _____

VACUUM SYSTEM

OPERATING PRESSURE: 1 X 10⁻⁵
 PUMPS: No. and type 2 TURBO
300 L/SEC

ION SOURCE(S)

Type	Intensity (mA)	θ (mrad)	$\epsilon_n = \beta\gamma\epsilon$ (mm mrad)	Ion Species
(a) COLD CATHODE	_____	_____	_____	d
(b)	_____	_____	_____	_____
(c)	_____	_____	_____	_____
(d)	_____	_____	_____	_____

INJECTION SYSTEM

NONE Efficiency _____ %

EXTRACTION SYSTEM

NONE Efficiency _____ %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μ A)	Internal	External
(a) DEUTERON	<u>24, 25</u>	<u>15</u>	_____	_____
(b) BEAM R-F IS PULSED	<u>2MS ON, 8 MS OFF</u>	_____	_____	_____
(c) PEAK BEAM DURING PULSE	<u>180</u> μ A	_____	_____	_____
(d)	_____	_____	_____	_____

Secondary Particles	E (MeV)	part/sec
(a) NEUTRON	<u>21</u>	<u>48</u> cGy/MIN.
(b) BERYLLIUM STOPPING	_____	FLATTENED
(c) TARGET	_____	_____

EXTRACTED BEAM PROPERTIES:

For _____ μ A of _____ MeV/u _____ ions
 $\Delta E/E$ _____ % $\Delta\phi$ _____ °rf
 $\epsilon_n = \beta\gamma\epsilon$ x _____ π mm mrad z _____ π mm mrad

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed 47 m² Moveable NONE m²
 Target Stations: 1 No. Served At Same Time: 1
 MAGNETIC SPECTROMETERS: NONE
 OTHER FACILITIES: ISOCENTRIC GANTRY, VARIABLE
 MULTI-ROD COLLIMATION SYSTEM FOR NEUTRON
 RADIATION THERAPY

REFERENCES/NOTES

- (a) IEEE TRANS. ON NUCL. SCI. NS-32 (1985) 3287
- (b) H. BLOSSER, PROC. 13TH INT. CONF. ON CYC. (1992) IN PRESS.

PLAN VIEW OF FACILITY, COMMENTS

V-VERTICAL LIFT DOOR
 T-THERAPY COUCH
 B-COUNTERWEIGHT
 R-GANTRY RINGS
 C-CYCLOTRON
 U-UTILITY ARM
 S-SERVICE PLATFORM
 P-PIT AREA

