

ENTRY No. III

NAME OF MACHINE HARPER HOSPITAL K100 CYCLOTRON DATE MAY 1989
 INSTITUTION NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY, MICHIGAN STATE UNIVERSITY
 ADDRESS NSCL/CYCLOTRON LABORATORY, EAST LANSING, MICHIGAN 48824-1321 USA
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 IN CHARGE H. BLOSSER REPORTED BY H. BLOSSER

HISTORY AND STATUS

DESIGN, date 81-84 Model tests 83-85
 ENG DESIGN, date
 CONSTRUCTION, date 84-89
 FIRST BEAM, date (or goal) APRIL 1989
 MAJOR ALTERATIONS

COST, ACCELERATOR \$1,800,000 (including gantry)
 COST, FACILITY, total
 FUNDED BY HARPER-GRACE HOSPITALS, INC.

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
 SCIENTISTS ENGINEERS
 TECHNICIANS CRAFTS

GRAD STUDENTS involved during year
 OPERATED BY Research staff or Operators
 OPERATION hr/wk, On target hr/wk
 TIME DISTR. in house % Outside %
 BUDGET, op & dev

FUNDED BY
 RESEARCH STAFF, not included above

USERS, in house outside
 GRAD STUDENTS involved during year

RESEARCH BUDGET, in house
 FUNDED BY

MAGNET
 POLE FACE, diameter (compact) cm, R extraction 30 cm
 R injection cm

GAP, min 3.8 cm, Field 55.3 kG } at 1,941,300
 max 40.6 cm, Field 40.7 kG }
 AVERAGE FIELD at R ext 47 kG } Ampere turns
 B max/

NUMBER OF SECTORS {compact 3 } Spiral, max .. deg
 {separated .. }
 SECTOR ANGLE (SSC) deg

TRIMMING COILS NONE

CONDUCTOR, material and type NbTi in Cu (2x4,747 turns)
 STORED ENERGY (cryogenic) 2.0 MJ
 POWER: main coils 0 max, kW; current stability
 trimming coils none max, kW; current stability

WEIGHT: Fr 24 US tons; coils 1 tons
 COOLING system conduction from helium bath

ION ENERGY (bending limit) E/A = 100 q²/a² MeV/amu
 (focusing limit) E/A = 50 q/a MeV/amu

ACCELERATION SYSTEM
 DEES, number 3; angle 50 deg
 BEAM APERTURE 4 cm; DC Bias kV

TUNED by, coarse fixed freq. fine
 RF 105 to MHz, stable ±
 Orb F 35 to MHz

HARMONICS, RF/Orb F, used 3
 DEE - Gnd, max 40 kV, min gap 0.4 cm

STABILITY, (pk-pk noise)/(pk RF volt)
 ENERGY GAIN, max 240 kV/turn

RF PHASE, stable to ± deg
 RF POWER input, max kW

FREQUENCY MODULATION, rate /s
 modulator, type
 beam pulse, width

VACUUM SYSTEM
 OPERATING PRESSURE 1x10 Torr or mbar
 PUMPS, No, Type, Size Turbo 300 I/sec

ION SOURCES
 PIG

INJECTION SYSTEM

NONE

EXTRACTION SYSTEM

NONE

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed m²; movable m²
 TARGET STATIONS in rooms
 STATIONS served at same time, max

MAG SPECTROGRAPH, type
 COMPUTER model
 OTHER FACILITIES Cyclotron mounts on 360° isocentric gantry

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (pA)	
	Goal	Achieved	Internal	External
d	50	50	20	

(part/s)

SECONDARY (part/s)

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH RF deg μA of MeV ions
 PHASE EXC, max RF deg μA of MeV ions
 EXTRACT eff % μA of MeV ions
 RESOL ΔE/E % μA of MeV ions
 EMITTANCE

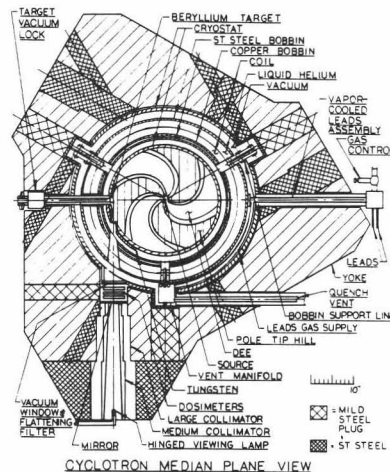
(κ mm. mrad) { axial } μA of MeV ions
 { rad }

OPERATING PROGRAMS, time distribution
 BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS
 BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS

REFERENCES/NOTES

- IEEE Trans, on Nuc. Sci, NS-32(1985)3287.
- H. Blosser, Proceedings of 12th Int.Conf. on Cyc. (1989), in press.

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS



CYCLOTRON MEDIAN PLANE VIEW