ENTRY NO. 85

NAME OF MACHINE University of Maryland Sectored Isochronous Cyclotron DATE 1/3/79
INSTITUTION University of Maryland, Department of Physics
ADDRESS College Park, Maryland 20742

IN CHARGE D. L. Hendrie REPORTED by D. A. Goldberg

HISTORY AND STATUS

DESIGN, date 1965 MODEL tests 1966/67
ENG. DESIGN, date 1967
CONSTRUCTION, date 1967/8
FIRST BEAM date (or goal) Feb. 1970
MAJOR ALTERATIONS Rebuilt Trim Coils 1975
Rebuilt R-F Ground Returns 1978
OPERATION, 130 hr/wk; On Target 104 hr/wk
TIME DIST., in house 88 %, outside 12 %
USERS' SCHEDULING CYCLE ~ 4wks. weeks
COST, ACCELERATOR $3.3 x 10^6
COST, FACILITY, total $8.5 x 10^6
FUNDED BY U.S.A.E.C. & State of Maryland

ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS 2.5 ENGINEERS 3
TECHNICIANS 7 CRAFTS 3
GRAD STUDENTS involved during year 0
OPERATED BY 35% Res staff or 65% Operators
BUDGET, op & dev See Note (a)
FUNDED BY N.S.F. and Univ. of MD.

RESEARCH STAFF, not included above

USERS, in house 15 outside 16
GRAD STUDENTS involved during year 9
RES. BUDGET, in house See Note (a)
FUNDED BY National Science Foundation

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 1000 m^2
movable ____ m^2
TARGET STATIONS 7 in 3 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type n= 1/2, 1 meter
COMPUTER, model IBM 360/44
OTHER FACILITIES Two 5 meter scattering chambers, one 2.5 meter scattering chamber, neutron irradiation, helium jet, neutron time-of-flight.

REFERENCES/NOTES

(a) Total Operating & Research Budget 1979 = $980K
(b) Inner and Outer sets; 2 prs. each.

MAGNET

POLE FACE diameter 267 cm; R extraction 115 cm
GAP, min 18.4 cm; Field 18 kG
max 53.4 cm; Field 12 kG
AVERAGE FIELD at R ext 14 kG
} at 0.4 X 10^6 ampere turns
CURRENT STABILITY 20 parts/10^6; $B_{max}/\langle B \rangle$ 1.4
NUMBER OF SECTORS 4 ; SPIRAL, max 52 deg
POLE FACE COIL PAIRS: AVF 1 /sec;
Harmonic correction See Note b
Rad grad N/A /sec or Circ coils 16
WEIGHT: Fe 400 tons; Coils 5 tons
CONDUCTOR, Material and type copper
STORED ENERGY ~ 2 MJ
COOLING SYSTEM Re-circ. deionized water
POWER: Main coils 400 (main) +400 (flutter) max, kW
Trimming coils 200 max, kW
YOKE/POLE AREA 100 %
SECTOR ANGLE (Sep Sec) N/A deg
ION ENERGY (Bending limit) E/A = 180 q^2/A^2 MeV
(Focusing limit) E/A = 140 q/A MeV

ACCELERATION SYSTEM

DEES, number 2 angle 90° deg
BEAM APERTURE 3 cm; DC BIAS 0 kV
TUNED by, coarse mov. panel fine same
RF 9.9 to 21.6 mHz, stable ± .1 /10^6
Orb F 3.8 to 21.6 mHz; GAIN, max 240 kV/turn
HARMONICS, RF/Orb F, used 1,2
DEE-Gnd, max 60 kV, min gap 4 cm
STABILITY, (pk-pk noise)/(pk RF volt) .3%
RF PHASE stable to ± 0.1 deg
RF POWER input, max 750 kW
RF PROTECT circuit, speed 2 μsec
Type Ignitron crowbar
FREQUENCY MODULATION, rate N/A /sec
MODULATOR, type
BEAM PULSE, width

VACUUM SYSTEM

PUMPS, No., Type, Size Two NRC HS32-32000
OPERATING PRESSURE 4 μTorr,
PUMPDOWN TIME 4 hrs

ION SOURCES/INJECTION SYSTEM

hot filament hooded arc

EXTRACTION SYSTEM Precessional; electrostatic defl. + mag. channel.

CONTROL SYSTEM

conventional

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CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	p	100	100
	^{4}He	140	165
	^{3}He	185	200
CURRENT		(μA)	(μA)
Internal	p		100
	^{4}He		20
	^{3}He		10
External	p		5
	^{4}He		3
	^{3}He		3
		(part/s)	(part/s)
Secondary			

BEAM PROPERTIES

	Measured	Conditions
Pulse Width	12 RF deg	____ μA of 100 MeV p
Phase Exc, max	±5° RF deg	____ μA of 100 MeV p
Extract Eff	90 %	____ μA of 100 MeV p
Res, ΔE/E	.2 %	____ μA of 100 MeV p
Emittance		
(mm-mrad)	< 25 axial, < 10 radial	____ μA of 100 MeV p

OPERATING PROGRAMS, time dist

Basic Nuclear Physics 87.5 %
Solid State Physics ____ %
Bio-Medical Applications 2 %
Isotope Production ____ %
Development 9 %
Atomic Physics 1.5 %
____ %

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, OPERATION SUMMARY, ADDITIONAL REFERENCES