ENTRY NO. 105

NAME OF MACHINE: 50 MeV Cyclotron — DATE: 3/15/84
INSTITUTION: Michigan State University
ADDRESS: Cyclotron Laboratory, East Lansing, MI 48824 USA
TEL: 517-355-9671 — TELEX:
IN CHARGE: H. Blosser — REPORTED BY: P. Miller

HISTORY AND STATUS

DESIGN, date: 1958-63 — Model tests: 1959-64
ENG DESIGN, date: 1961-63
CONSTRUCTION, date: 1962-65
FIRST BEAM, date (or goal): Feb. 1965
MAJOR ALTERATIONS:
COST, ACCELERATOR: $940,000
COST, FACILITY, total: $3,900,000
FUNDED BY: National Science Foundation

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): 170 cm, R-extraction: 73 cm
R injection: cm
GAP, min: 16.8 cm, Field: 19.3 kG
max: cm, Field: 8.5 kG } at 475,000 Ampere turns
AVERAGE FIELD at R ext: 15 kG
B max/<B>:
NUMBER OF SECTORS: compact 3, separated — Spiral, max: deg
SECTOR ANGLE (SSC): deg
TRIMMING COILS: 8 (circular)
CONDUCTOR, material and type: hollow copper
STORED ENERGY (cryogenic): MJ
POWER: main coils 140 max kW: current stability $1/10^5$
trimming coils 15 max kW: current stability $1/10^3$
WEIGHT: Fe 103 US tons: coils 13 US tons
COOLING system: water
ION ENERGY (Bending limit) E/A = 57 q^2/A^2 MeV/amu
(Focusing limit) E/A = 60 q/A MeV/amu

ACCELERATION SYSTEM

DEES, number: 2 angle: 134 deg
BEAM APERTURE: 2.5 cm; DC Bias: 0 kV
TUNED by, coarse: panels fine: capacitive blade
RF: 14.3 to 21.5 MHz, stable ±
Orb F: 3.5 to 21.5 MHz
HARMONICS, RF/Orb F, used: 1,2,4
DEE–Gnd, max: 70 kV, min gap: 0.9 cm
STABILITY, (pk-pk noise)/(pk RF volt): 6/10.000
ENERGY GAIN, max: 250 kV/turn
RF PHASE, stable to ±: deg
RF POWER input, max.: 250 kW
FREQUENCY MODULATION, rate: /s
modulator, type:
beam pulse, width:

VACUUM SYSTEM

OPERATING PRESSURE: 1×10^{-5} Torr or mbar
PUMPS, No, Type, Size: 1 - 36" oil diffusion pump with freon baffle

ION SOURCES

Hooded arc filament, PIG

INJECTION SYSTEM

EXTRACTION SYSTEM

Precessional into 60° elect. defl. into 45° iron free channel.

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed: m^2; movable: m^2
TARGET STATIONS: in rooms
STATIONS served at same time, max:
MAG SPECTROGRAPH, type:
COMPUTER model:
OTHER FACILITIES:

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
P	40	56	2,000*	20
d		26		10
^{3}He		76		10
12C 4+	54	77		10
SECONDARY			(part/s)	

BEAM PROPERTIES

MEASURED		CONDITIONS			
PULSE WIDTH	1.5 RF deg	14	pμA of 40 MeV	P	ions
PHASE EXC. max	RF deg		pμA of	MeV	ions
EXTRACT eff	100 %	15	pμA of 40 MeV	P	ions
RESOL ΔE/E	0.06 %	10	pμA of 40 MeV	P	ions
EMITTANCE					
(π mm-mrad)	1.6 axial, 0.1 rad	1.0	pμA of 40 MeV	p	

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS: SOLID STATES PHYSICS:
BIOMEDICAL APPLICAT.: ISOTOPE PRODUCTIONS:

REFERENCES/NOTES

1) Proc. 7th Int.Conf. (Zurich) 1975, 249
2) Nuc. Inst. & Meth. 143 (1977) 63

PLAN VIEW OF FACILITY, COMMENTS, ETC.

Cyclotron was be-commissioned in 1979.
RF system, deflector, vacuum system are partly dis-assembled. Power supplies are connected to other equipment.

* to 1/3 radius (probe power limit)