ENTRY NO. 86

NAME OF MACHINE 50 MeV Cyclotron DATE 3/15/84

INSTITUTION Michigan State University

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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 73cm

R injection cm

GAP, min 16.8 cm, Field 19.3 kG
min 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 ± $1/10^7$

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 POWEP 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

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
$^3He^{4+}$		76		10
^{12}C	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 ions

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 de-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)