ENTRY No. 75

NAME OF MACHINE 50 MeV Cyclotron DATE 8/1/81
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 73 cm
R injection cm
GAP, min 16.8 cm, Field 19.3 kG
max cm, Field 8.5 kG
AVERAGE FIELD at R ext 15 kG
at 475,000 Ampere turns
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 1/10^3
trimming coils 15 max, kW ; current stability 1/10
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 7.0 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 m² ; movable m²
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
$^3He^{4+}$		76		10
$^{12}C^{4+}$	54	77		10
SECONDARY			(part/s)	

BEAM PROPERTIES

MEASURED		CONDITIONS
PULSE WIDTH 1.5	RF deg	14 pμ A of 40 MeV P ions
PHASE EXC, max	RF deg	pμ A of MeV ions
EXTRACT eff 100	%	15 pμ A of 40 MeV P ions
RESOL ΔE/E 0.06	%	10 pμ A 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 ....
Cyclotron in standby status since July 1979

REFERENCES/NOTES
Proc. 7th Int. Conf.(Zurich) 1975. 249
Nuc. Inst. & Meth. 143 (1977) 63

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

Cyclotron beam transport system has been disassembled.

Experimental areas have been reconfigured for utilization with new K500 cyclotron.

*To 1/3 radius (probe power limit)