ENTRY NO. 113

NAME OF MACHINE SLOAN-KETTERING INSTITUTE CYCLOTRON date: May 1975
INSTITUTION Sloan-Kettering Institute for Cancer Research
ADDRESS New York, NY, USA
TEL TELEX
IN CHARGE T.Y.T. KUO REPORTED BY T.Y.T. KUO

HISTORY AND STATUS

DESIGN, date CS-15, Cyclotron corporation
ENG DESIGN, date
CONSTRUCTION, date Nov., 1967
FIRST BEAM, date (or goal)
MAJOR ALTERATIONS see features

COST, ACCELERATOR
COST, FACILITY, total
FUNDED BY

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 0.5 ENGINEERS 1.2
TECHNICIANS 0 CRAFTS 0.2
GRAD STUDENTS involved during year
OPERATED BY Research staff or Operators
OPERATION 60 hr/wk. On target 30 hr/wk
TIME DISTR. in house 98 %, outside 2 %
BUDGET, op & dev
FUNDED BY NCI ERDA

RESEARCH STAFF, not included above

USERS, in house 8 outside 1
GRAD STUDENTS involved during year
RESEARCH BUDGET, in house
FUNDED BY NCI ERDA

MAGNET

POLE FACE, diameter (compact) 80 cm, R-extraction 36cm
R injection cm
GAP, min .5 cm, Field 20 kG
max 10 cm, Field 12 kG } at 2.10^5 Ampere turns
AVERAGE FIELD at R ext kG
B max/<B>
NUMBER OF SECTORS { compact 3 / separated } Spiral, max 0 deg
SECTOR ANGLE (SSC) deg
TRIMMING COILS

CONDUCTOR, material and type
STORED ENERGY (cryogenic) MJ
POWER: main coils 40 max kW: current stability 10^{-4}
trimming coils max kW: current stability
WEIGHT: Fe tons: coils tons
COOLING system water
ION ENERGY (Bending limit) E/A = q^2/A^2 MeV/amu
(Focusing limit) E/A = q/A MeV/amu

ACCELERATION SYSTEM

DEES, number 2; angle 120 deg
BEAM APERTURE 2 cm; DC Bias 1.5 kV
TUNED by, coarse MP fine VC, trimmer
RF 12,16,24 MHz, stable ± 10^{-5}
Orb F 12,16,24 to MHz
HARMONICS, RF/Orb F, used 1
DEE–Gnd, max 30 kV, min gap cm
STABILITY, (pk-pk noise)/(pk RF volt) $5\ 10^{-4}$
ENERGY GAIN, max 120 kV/turn
RF PHASE, stable to ± deg
RF POWER input, max. 30 kW
FREQUENCY MODULATION, rate /s
modulator, type
beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 1 μ Torr or mbar
PUMPS, No, Type, Size

ION SOURCES

Internal PIG 1)

INJECTION SYSTEM

EXTRACTION SYSTEM

See features

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 60 m^2; movable m^2
TARGET STATIONS 1 in 1 rooms rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type
COMPUTER model IBM 1800
OTHER FACILITIES Int. and ext. isotop poduction
Irradiation, solid state, biological
Time of flight study being developed

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p	15	14.7	500	100 2)
d	7.5	7.9	800 1)	400 2)
$^3He^{2+}$	20	23.3	400 1)	200 2)
			400 1)	300 2)
SECONDARY			(part/s)	
n 3)				13

BEAM PROPERTIES

MEASURED	CONDITIONS		
PULSE WIDTH RF deg	pμ A of	MeV	ions
PHASE EXC. max RF deg	pμ A of	MeV	ions
EXTRACT eff 70 %	200 pμ A of 23	MeV	$^3He^{2+}$ ions
RESOL ΔE/E %	pμ A of	MeV	ions
EMITTANCE			
(π mm-mrad) 16 axial, 16 rad	90 pμ A of	MeV	

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS
BIOMEDICAL APPLICAT. 100% ISOTOPE PRODUCTIONS

REFERENCES/NOTES

Radiology 93, 331-337, 1969
IEEE Trans. Nucl. Sci., NS-14 (3), 1967
Proc. of the 5th and 6th Int. Cycl.Conf. 1969-1972
Proc. of the 1975 Nat. Acc. Conf.

PLAN VIEW OF FACILITY, COMMENTS, ETC.

First prototype cyclo. built by cyclo. Corp. Major modif.: dees, RF system, ion source, extr. system.

1) 4 independant coordinate controls for ion source. High beam currents resulted from high operating power density (∿140 kW/cm^3)

2) Extraction system

- harmonic coils: azimut-angle and I controls
- deflector: fine adjust of R_{ext} (change of E also), taper angle adjust, channel gap adjust, dc voltage adjlust.
- magnetic channel: compensated-iron type, entrance position control, exit position and channel curvature controls.

3) Neutron programs: dosimetry,n physics, activation, therapy.