ENTRY NO. 120

NAME OF MACHINE . CNTS (Clinical Neutron Therapy System) Scanditronix MC50 Cyclotron
INSTITUTION . University of Washington
ADDRESS . Seattle, Washington U.S.A.
TEL . 206-548-4112 TELEX . 4740096 UW UI FAX: 206-543-4365
IN CHARGE P. Wootton REPORTED BY R. Risler

HISTORY AND STATUS

DESIGN, date 1980 Model tests 1980
ENG DESIGN, date 1980/81
CONSTRUCTION, date 1981/82
FIRST BEAM, date (or goal) Factory: June 82
~~MAJOR ALTERATIONS~~ Facility: June 83
First Patient: October 84
COST, ACCELERATOR $4.2 Million (U.S.)
COST, FACILITY, total $7.0 Million (U.S.)
FUNDED BY U.S. National Cancer Institute

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS ENGINEERS 2
TECHNICIANS 2 CRAFTS
GRAD STUDENTS involved during year
OPERATED BY x Research staff or x Operators
OPERATION 48 hr/wk. On target hr/wk
TIME DISTR. in house 100 %, outside %
BUDGET, op & dev
FUNDED BY U.S. National Cancer Institute

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) 155 cm, R-extraction 57 cm
R injection Int. cm
GAP, min 11.5 cm, Field kG
max 20.5 cm, Field 21.3 kG at 875 A, 320 turns
AVERAGE FIELD at R ext 17.1 kG Ampere turns
B max/<B>
NUMBER OF SECTORS compact 3 separated Spiral, max 55 deg
SECTOR ANGLE (SSC) deg
TRIMMING COILS 10 gradient, 4 harmonic
CONDUCTOR, material and type Cu
STORED ENERGY (cryogenic) MJ
POWER: main coils 110 max kW: current stability 10^{-5}
trimming coils 5 max kW: current stability
WEIGHT: Fe 90 tons: coils tons
COOLING system deionized water
ION ENERGY (Bending limit) E/A = 51 q^2/A^2 MeV/amu
(Focusing limit) E/A = q/A MeV/amu

ACCELERATION SYSTEM

DEES, number 2 angle 90 deg
BEAM APERTURE 2.5 cm; DC Bias - kV
TUNED by, coarse piston fine flap
RF 20 to 26 MHz, stable ± 10^{-6}
Orb F 10 to 26 MHz
HARMONICS, RF/Orb F, used 1,2
DEE–Gnd, max 41.5 kV, min gap 10^{-3} 35 cm
STABILITY, (pk-pk noise)/(pk RF volt) 10
ENERGY GAIN, max 160 kV/turn
RF PHASE, stable to ± 1 deg
RF POWER input, max. 60 kW
FREQUENCY MODULATION, rate - /s
modulator, type
beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 10^{-6} Torr or mbar
PUMPS, No, Type, Size 2 oil diffusion
8500 liters/sec total

ION SOURCES

internal PIG, dual chimney

INJECTION SYSTEM

-

EXTRACTION SYSTEM

Electrostatic Deflector/EM channel/

FACILITIES FOR RESEARCH 2 passive focussing channels

SHIELDED AREA, fixed 265 m^2; movable m^2
TARGET STATIONS 2 Tr. rooms, 1 isotope in cy vault rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type
COMPUTER model PDP 11/23
OTHER FACILITIES Two neutron therapy treatment rooms,

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p	50	51	100+	70
d	25	24		
SECONDARY			(part/s)	

BEAM PROPERTIES

	MEASURED		CONDITIONS		
PULSE WIDTH	RF deg		pμA of	MeV	ions
PHASE EXC. max	RF deg		pμA of	MeV	ions
EXTRACT eff	75 %	10	pμA of 50.5	MeV	p ions
RESOL ΔE/E	%		pμA of	MeV	ions
EMITTANCE					
(π mm-mrad)	15 axial, 15 rad	10.	pμA of 50.5	MeV	

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS . . . SOLID STATES PHYSICS
BIOMEDICAL APPLICAT 98 . . . ISOTOPE PRODUCTIONS 2

REFERENCES/NOTES

1)
2)

PLAN VIEW OF FACILITY, COMMENTS, ETC.