ENTRY No. CU41

NAME OF MACHINE NIRS-Chiba Cyclotron ... DATE Jan. 1989
INSTITUTION National Institute of Radiological Sciences
ADDRESS 9-1, Anagawa-4-chome, Chiba-shi, 260 Japan
TEL 0472(51)2111 ... TELEX 3722205 NIRS J
IN CHARGE T. Kondo ... REPORTED BY T. Yamada

HISTORY AND STATUS CGR-MeV Model 930
DESIGN, date ... Model tests ...
ENG DESIGN, date ...
CONSTRUCTION, date 1972 - 1973
FIRST BEAM, date (or goal) Dec. 1973
MAJOR ALTERATIONS ...
...
COST, ACCELERATOR ...
COST, FACILITY, total ...
FUNDED BY ...

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
SCIENTISTS 4 ... ENGINEERS ...
TECHNICIANS 4 ... CRAFTS ...
GRAD STUDENTS involved during year ...
OPERATED BY ... Research staff or 4 ... Operators
OPERATION 38 ... hr/wk, On target ... hr/wk
TIME DISTR. In house 100 ... %, Outsido ... %
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) .... cm, R extraction .... cm
R injection ..... cm
GAP, min 16.6 ... cm, Field 20.1 ... kG
max 40.5 ... cm, Field 11.7 ... kG
at 0.36×10^6 Ampere turns
AVERAGE FIELD at R ext 16.4 ... kG
B max/ <B> ...
NUMBER OF SECTORS { compact 4 / separated ... } Spiral, max 53 deg
SECTOR ANGLE (SSC) ... deg
TRIMMING COILS 12 Circular Coils
2 per sector (Harmonic)
CONDUCTOR, material and type Cu, hollow
STORED ENERGY (cryogenic) ... MJ
POWER : main coils 360 .. max, kW ; current stability $\pm 2 \times 10^{-5}$
trimming coils 75 .. max, kW ; current stability $\pm 1 \times 10^{-4}$
WEIGHT : Fe 200 ... tons ; coils 6 ... tons
COOLING system Demineralized water
ION ENERGY (bending limit) E/A = ~110 q^2/a^2 MeV/amu
(focusing limit) E/A = ~93 q^2/a^2 MeV/amu

ACCELERATION SYSTEM
DEES, number 2 ... ; angle 86 ... deg
BEAM APERTURE 3.8 ... cm ; DC Bias 0 ... kV
TUNED by, coarse MP ... fine MP. Auto ...
RF 10.6 to 22.0 ... mHz, stable $\pm < 1 \times 10^{-6}$
Orb F 5.3 to 21.14 .. mHz
HARMONICS, RF/Orb F, used 1, 2
DEE - Gnd, max 50 kV, min gap 4 ... cm
STABILITY, (pk-pk noise)/(pk RF volt) ... $< 1 \times 10^{-3}$
ENERGY GAIN, max 200 ... kV/turn
RF PHASE, stable to ± ... < 0.5 ... deg
RF POWER input, max 160 ... kW
FREQUENCY MODULATION, rate ... /s
modulator, type ...
beam pulse, width ...

VACUUM SYSTEM
OPERATING PRESSURE 2×10^{-6} ... Torr or mbar
PUMPS, No, Type, Size ...
6x2000 l/s turbo-molecular pumps
...

ION SOURCES
Hot filament for light ions and penning for heavy ions.

INJECTION SYSTEM
...
EXTRACTION SYSTEM Electrostatic deflector and magnetic channels (Active and Passive)
FACILITIES FOR RESEARCH
SHIELDED AREA, fixed 376 ... m^2 ; movable ... m^2
TARGET STATIONS 8 ... in 4 ... rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type ...
COMPUTER model ...
OTHER FACILITIES Radiotherapies Facility
Radiopharmaceuticals production and Nuclear Medical diagnosis Facilities

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p		8 -89		20
d		10-52.5		40
^{3}He		24-140		15
^{4}He		20-105		10
SECONDARY				(part/s)

BEAM PROPERTIES

MEASURED		CONDITIONS		
PULSE WIDTH 2.5 .. RF deg	20	pμ A of 30 .. MeV	d ..	ions
PHASE EXC, max ... RF deg		pμ A of .... MeV	...	ions
EXTRACT eff 80 .... %	35	pμ A of 30 .. MeV	d ..	ions
RESOL ΔE/E ..... %		pμ A of .... MeV	...	ions
EMITTANCE				
(π mm. mrad) { ... axial / ... rad }		pμA of ..... MeV	...	ions

OPERATING PROGRAMS, time distribution
BASIC NUCLEAR PHYSICS ... 68% SOLID STATES PHYSICS ... 32%
BIOMEDICAL APPLICAT. ... ISOTOPE PRODUCTIONS ...
...
...

REFERENCES/NOTES

1] Y. Sato et al, Proc. of 9th Int. Conf. on Cyclotrons (1981) 597.
2] T. Yamada et al, Proc. of 11th Int. Conf. on Cyclotrons (1986) 61

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS