

ENTRY No. 44

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
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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 % 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) 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 0.36x10^6
AVERAGE FIELD at R ext 16.4 kG Ampere turns
B max/ <B>

NUMBER OF SECTORS {compact 4} Spiral, max 53 deg
{separated}
SECTOR ANGLE (SSC) deg

TRIMMING COILS 12 Circular Coils
2 per sector (Harmonic)

CONDUCTOR, material and type Cu, hollow
STORED ENERGY (cryogenic) MJ -5

POWER: main coils 360 max, kW; current stability +/- 2x10^-4
trimming coils 75 max, kW; current stability +/- 1x10^-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 +/- 1x10^-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) < 1x10^-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 2x10^-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 3.76 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) CURRENT (pA)
Goal Achieved Internal External

P 8-89 20
3d 10-52.5 40
He 24-140 15
4He 20-105 10

SECONDARY (part/s)

BEAM PROPERTIES
MEASURED CONDITIONS

PULSE WIDTH 25 RF deg 20 pA of 30 MeV d. ions
PHASE EXC, max RF deg pA of MeV ions
EXTRACT eff 80 % 35 pA of 30 MeV d. ions

RESOL Delta E/E % pA of MeV ions
EMITTANCE
(pi mm. mrad) { axial } pA of MeV ions
{ rad }

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

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