

ENTRY No. 39

NAME OF MACHINE RCNP Isochronous Cyclotron DATE 7/21/81
 INSTITUTION Research Center for Nuclear Physics, Osaka University
 ADDRESS Suita, Osaka 565, JAPAN
 TEL (06) 877-5111 TELEX
 IN CHARGE M. Kondo REPORTED BY T. Saito

HISTORY AND STATUS

DESIGN, date 1965 Model tests 1966 ~ 69
 ENG DESIGN, date 1970 ~ 72
 CONSTRUCTION, date 1971 ~ 73
 FIRST BEAM, date (or goal) 1974
 MAJOR ALTERATIONS none

COST, ACCELERATOR $\$3.5 \times 10^6$
 COST, FACILITY, total $\$9 \times 10^6$
 FUNDED BY Ministry of Education, JAPAN

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS (8) ENGINEERS
 TECHNICIANS (8) CRAFTS
 GRAD STUDENTS involved during year
 OPERATED BY x Research staff or x Operators
 OPERATION 130 hr/wk, On target 100 hr/wk
 TIME DISTR. in house % , Outside %
 BUDGET, op & dev $\$1.5 \times 10^6$

FUNDED BY Ministry of Education
RESEARCH STAFF, not included above
 USERS, in house outside
 GRAD STUDENTS involved during year
 RESEARCH BUDGET, in house $\$1 \times 10^6$
 FUNDED BY Ministry of Education

MAGNET

POLE FACE, diameter (compact) 230 cm, R extraction 100 cm
 R injection cm
 GAP, min 20.7 cm, Field 19.5 kG }
 max 34.7 cm, Field 12.0 kG } at 4×10^5
 AVERAGE FIELD at R ext 16.0 kG } Ampere turns
 B max/ 1.2
 NUMBER OF SECTORS { compact 3 } Spiral, max 5.2 deg
 { separated }
 SECTOR ANGLE (SSC) deg
 TRIMMING COILS 16 circular

CONDUCTOR, material and type MI Hollow
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 450 max, kW ; current stability 10^{-5}
 trimming coils 265 max, kW ; current stability 10^{-4}
 WEIGHT : Fe 400 tons ; coils 13 tons
 COOLING system H₂O
 ION ENERGY (bending limit) E/A = 120 q²/a² MeV/amu
 (focusing limit) E/A = 80 q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 1 ; angle 180 deg
 BEAM APERTURE 4.4 cm ; DC Bias 0 kV
 TUNED by, coarse Moving Short fine Trimming Capacitor Auto
 RF 6 to 18 mHz, stable $\pm 5 \times 10^{-9}$
 Orb F 1.2 to 18 mHz
 HARMONICS, RF/Orb F, used 1, 3
 DEE - Gnd, max 80 kV, min gap cm
 STABILITY, (pk-pk noise)/(pk RF volt) 1×10^{-4}
 ENERGY GAIN, max 160 kV/turn
 RF PHASE, stable to ± 1 deg
 RF POWER input, max 430 kW
 FREQUENCY MODULATION, rate /s
 modulator, type
 beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 1×10^{-6} Torr or mbar
 PUMPS, No, Type, Size 3 Diffusion Pumps
 (one 55cm, two 90cm)

ION SOURCES Int Oak Ridge type & Penning
 Ext Polarized p and d

INJECTION SYSTEM

EXTRACTION SYSTEM

Electrostatic deflector, Magnetic channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 1130 m² ; movable m²
 TARGET STATIONS 11 in 5 rooms
 STATIONS served at same time, max 1
 MAG SPECTROGRAPH, type ODDO
 COMPUTER model Tospac 5600/160, PDP 11/40 & 70
 OTHER FACILITIES Scattering Chamber, Scattering Chamber
 with Polarization Monitor, In-Beam Gamma Ray
 Facility, Irradiation Facility with Rabbit System

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (pμA)	
	Goal	Achieved	Internal	External
² H		80	0.022	0.02
¹⁴ N ⁵⁺		75	50	20
²⁰ Ne ⁵⁺		215	3	1.4
		150	0.4	0.1

SECONDARY (part/s)

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH 12 RF deg 0.1 pμA of 40 MeV p ions
 PHASE EXC, max 5 RF deg 1.2 pμA of 90 MeV α ions
 EXTRACT eff 90 % 1.2 pμA of 65 MeV p ions
 RESOL ΔE/E 0.2 % 1.2 pμA of 90 MeV α ions
 EMITTANCE
 (π mm. mrad) { 10 axial } 1.2 pμA of 90 MeV α ions
 { 20 rad }

OPERATING PROGRAMS, time distribution
 BASIC NUCLEAR PHYSICS 90% SOLID STATES PHYSICS
 BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS

REFERENCES/NOTES

M. Kondo et al., Seventh International Conference on Cyclotrons and their Applications, Zürich (1975), pp. 95-98.

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

