

ENTRY NO. C32 Date Sept. 28, 1995
 Name of Machine RCNP Ring Cyclotron
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 In Charge: I. Miura Reported by: I. Miura

HISTORY

MILESTONE DATES:

Design 1985 Model Tests 1987
 Construction Aug. 1987 First Beam Oct. 1991

DESIGN/CONSTRUCTION BY:

in house design other constructed by SHI

COST: Accelerator 3.8 B¥ Facility 1.6 B¥

FUNDED BY: Ministry of Education, Japan

STATUS SEE RCNP AVF

STAFF: Machine

Scientists Engineers
 Technicians Students
 Research (in house/external)

Scientists / Engineers /
 Technicians / Students /

BUDGET: Machine Funded by
 Research Funded by

TIME DISTRIBUTION:

Basic Research (in house/external) % / %
 Applied Program (in house/external) % / %
 Maintenance % Development %

MAGNET

POLE PARAMETERS:

Diameter cm R_{extract} 400 cm R_{inject} 200 cm

HILL PARAMETERS: Gap (min) 6 cm B_{max} 1.75 T

(@ AT) Gap (max) cm B_{min} T

VALLEY PARAMETERS: Gap (min) cm B_{max} T

(@ AT) Gap (max) cm B_{min} T

AVERAGE FIELD: $\langle B \rangle_{\text{min}}$ T $\langle B \rangle_{\text{max}}$ 0.76 T

NUMBER OF SECTORS: compact/separated / 6

sector angle 22-27.5 deg. spiral (max) 30 deg.

FIELD TRIMMING: Trim Coils 36

Harmonic Coils 3

Other

CURRENT: Main Coils 900 Amps Stability 3×10^{-6}

Trim Coils 500x16-350x20 Amps Stability 1×10^{-5}

Stored Energy (cryogenic) MJ

WEIGHT: Iron 2200 ton Conductor 32 ton

ION ENERGY: Bending Limit E/A = 400 q^2/A^2 MeV/u

Focusing Limit E/A = >400 q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:

Description: Single gap type

No. of Gaps/turn 3 dE/dn(max) 1.5 MeV/q

Voltage (max) 0.5 MV Harmonic f_H/f_{ion} 6, 10, 12, 18

Freq 30 ~ 52 MHz Power in(max) 0.25x3 MW

Stability: Phase 0.01° Voltage 10⁻⁴

OTHER CAVITIES (Flattopping or otherwise):

Description: Single gap type, Flattopping

Region of Influence: R_{min} 200 cm R_{max} 400 cm

No. of Gaps/turn 1 dE/dn(max) 0.17 MeV/q

Voltage (max) 0.17 MV Harmonic f_H/f_{ion} 18, 30, 36, 54

Freq 90 ~ 155 MHz Power in(max) 0.045 MW

Stability: Phase 0.01° Voltage 10⁻⁴

VACUUM SYSTEM

OPERATING PRESSURE: 1x10⁻⁷ Torr

PUMPS: (No. and type) 6 Cryo. pumps 500φ

3 Cryo. pumps 400φ, 3 Diff. pumps 400φ

ION SOURCE(S)

Type	Intensity (mA)	@ $\epsilon_n = \beta\gamma\epsilon$ (π mm mrad)	Ion Species
(a)			
(b)			
(c)			
(d)			

INJECTION SYSTEM

2 inflector + 2 magnetic channel Efficiency (100) %

EXTRACTION SYSTEM

2 deflector + 2 magnetic channel Efficiency (100) %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μA)
		Internal External
(a) p, pol. p	400	~ 0.5 ~ 0.5
(b) ³ He ²⁺	150	~ 0.4 ~ 0.4
(c) ⁴ He ²⁺	100	~ 0.4 ~ 0.4
(d) ¹⁴ N ⁷⁺	70	~ 0.02 ~ 0.02

Secondary Particles	E (MeV)	part/sec
(a)		
(b)		
(c)		

EXTRACTED BEAM PROPERTIES:

For 0.5(0.05) μA of 400 MeV/u p ions
 $\Delta E/E$ 0.1(0.02) % $\Delta\phi$ 10 °rf
 $\epsilon_n = \beta\gamma\epsilon$ x 1 π mm mrad z 1 π mm mrad

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed: 3600 m² Moveable 0 m²

Target Stations: 5 No. Served At Same Time: 1

MAGNETIC SPECTROMETERS: p/Δp=39000, 54kGm/p/Δp=5000, 32kGm

OTHER FACILITIES:

100m TOF Tunnel and 0-90° Beam Swinger

Secondary-Beam Course

REFERENCES/NOTES

- Commissioning of the RCNP Ring Cyclotron, Proc. of
- the 13th Conf. on Cyc. Present Status of the RCNP cyclotron facility, Proc. of this conf.

PLAN VIEW OF FACILITY, COMMENTS

