ENTRY NO. C31 **Date** 22 September, 1995

Name of Machine RCNP AVF Cyclotron

Institution Research Center for Nuclear Physics, Osaka University

Address Mihogaoka 10-1 Ibaraki, Osaka 567, Japan

Tel 06-879-8936 **Telex** 5286214 RCNPJ **Fax** 06-879-8899 **E-MAIL** hosono@jpnrcnp

In Charge: K. Hosono **Reported by:** K. Hosono

hosono@rcnpvx.rcnp.osaka-u.ac.jp

HISTORY

MILESTONE DATES:
Design 1970-1972 Model Tests 1966-1969
Construction 1971-1973 First Beam 1974

DESIGN/CONSTRUCTION BY:
in house Design other engineering contracts

COST: Accelerator $3,500,000 Facility $9,000,000

FUNDED BY: Ministry of Education, Science and Caltures

STATUS

STAFF: Machine
Scientists 10(including Engineers 4
Technicians ring cyclo. Students 2
Research (in house/external)
Scientists (14) / Engineers 2 /
Technicians / Students 20 /

BUDGET: Machine Funded by
Research Funded by

TIME DISTRIBUTION:
Basic Research (in house/external) 85 % / %
Applied Program (in house/external) 5 % / %
Maintenance 5 % Development 5 %

MAGNET

POLE PARAMETERS:
Diameter 230 cm $R_{extract}$ 100 cm R_{inject} cm

HILL PARAMETERS: Gap (min) 20.7 cm B_{max} 1.95 T
(@ AT) Gap (max) cm B_{min} T

VALLEY PARAMETERS: Gap (min) 34.7 cm B_{max} 1.2 T
(@ AT) Gap (max) cm B_{min} T

AVERAGE FIELD: $<B>_{min}$ T $<B>_{max}$ 1.6 T

NUMBER OF SECTORS: compact/separated 3 /
sector angle deg. spiral (max) 52 deg.

FIELD TRIMMING: Trim Coils 16 circular
Harmonic Coils 5/sector
Other

CURRENT: Main Coils 1430 Amps Stability 4×10^{-6}
Trim Coils 1400 &750 Amps Stability 1×10^{-5}
Stored Energy (cryogenic) MJ

WEIGHT: Iron 400 tons Conductor COpper hollow

ION ENERGY: Bending Limit E/A = 140 q^2/A^2 MeV/u
Focusing Limit E/A = 80 q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:
Description: single Dee, Coaxial Resonator
No. of Gaps/turn 2 dE/dn(max) 0.15 MeV/q
Voltage (max) 0.075 MV Harmonic f_{rf}/f_{ion} 1, 3
Freq 5.5 - 18 MHz Power in(max) 0.4 MW
Stability: Phase 0.1 deg. Voltage 1×10^{-4}

OTHER CAVITIES (Flattopping or otherwise):
Description:
Region of Influence: R_{min} cm R_{max} cm
No. of Gaps/turn dE/dn(max) MeV/q
Voltage (max) MV Harmonic f_{rf}/f_{ion}
Freq MHz Power in(max) MW
Stability: Phase Voltage

VACUUM SYSTEM

OPERATING PRESSURE: 4×10^{-5} Pa
PUMPS: (No. and type) 3 Diffusion pumps (two 90cm, one 55cm)

ION SOURCE(S)

	Type	Intensity (mA)	@ $\varepsilon_n = \beta\gamma\varepsilon$ (π mm mrad)	Ion Species
(a)	Polarized	0.5		p, d
(b)	ECR	0.5		p,d,^{3}He,
(c)				alpha,
(d)		0.05		6,7Li, ^{14}N

INJECTION SYSTEM

Magnetic focus with glazer lenses and spiral inflector Efficiency 10 %

EXTRACTION SYSTEM

Electrostatic deflector Efficiency 50-100 %

CHARACTERISTIC BEAMS

	Accelerated Ions	E/A (MeV/u)	Current (part μA) Internal	External
(a)	p,pol p	max. 80	50	50
(b)	^{3}He	max 53	50	50
(c)	alpha	max 35	50	50
(d)	$^{14}N^{5+}$	max 15	5	5

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

EXTRACTED BEAM PROPERTIES:
For 5 μA of 65 MeV/u p ions
$\Delta E/E$ 0.1 % $\Delta\phi$ 12 °rf
$\varepsilon_n = \beta\gamma\varepsilon$ x 6 π mm mrad z 3 π mm mrad

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed: 1130 m^2 Moveable m^2
Target Stations: No. Served At Same Time:
MAGNETIC SPECTROMETERS: QDDQ
OTHER FACILITIES: 1. Recoil mass separator
2. Injection system to the Ring cyclotron
3. A course for basic research of medical science

REFERENCES/NOTES

(a) M. Kondo et al., 8th Int. Conf. on Cyclotron p.180 (1978)
(b) K. Hosono et al., this conference

PLAN VIEW OF FACILITY, COMMENTS

1. New atomic type high intensity polarized ion source , ECR Neomafios and a new vertical injection system were installed.
2. Control system was replaced to a computer control system.
3. Main coil power supply was exchanged to a new one. The current stability is 4×10^{-6}.