

ENTRY NO. C33 Date September 25, 1995
 Name of Machine RIKEN AVF Cyclotron (715 CYCLOTRON-RIKEN)
 Institution The Institute of Physical and Chemical Research (RIKEN)
 Address Wako-shi, Saitama 351-01, Japan
 Tel 048-462-1111 Telex 296-2818 RIKEN J Fax 048-461-5301 E-MAIL goto@ringps.riken.go.jp
 In Charge: A.Goto Reported by: A.Goto

HISTORY

MILESTONE DATES:

Design 1985-1987 Model Tests
 Construction 1987-1989 First Beam April 1989
 DESIGN/CONSTRUCTION BY: Design RIKEN/SHI
 in house other Construction SHI
 COST: Accelerator ¥1.2B (incl.BT) Facility
 FUNDED BY: Science and Technology Agency (STA)

STATUS

STAFF: Machine Same as those of the RIKEN Ring Cyclotron(RRC).

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 172.6 cm R_{extract} 71.4 cm R_{inject} 1.63 cm

HILL PARAMETERS: Gap (min) 12.8 cm B_{max} 2.02 T
 (@ 320,000 AT) Gap (max) cm B_{min} T

VALLEY PARAMETERS: Gap (min) cm B_{max} T
 (@ 320,000 AT) Gap (max) 30.0 cm B_{min} 1.14 T

AVERAGE FIELD: $\langle B \rangle_{\text{min}}$ 0.5 T $\langle B \rangle_{\text{max}}$ 1.7 T

NUMBER OF SECTORS: compact/separated 4 /
 sector angle deg. spiral (max) 50 deg.

FIELD TRIMMING: Trim Coils 9 pairs
 Harmonic Coils 4 pairs (in the extraction region)

Other
 CURRENT: Main Coils 1113 Amps Stability $\pm 1 \times 10^{-5}$
 Trim Coils 70-300 Amps Stability $\pm 2 \times 10^{-4}$
 Stored Energy (cryogenic) MJ

WEIGHT: Iron 102 tons Conductor 5.3 tons
 ION ENERGY: Bending Limit E/A = 7.0 q²/A² MeV/u
 Focusing Limit E/A = q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:

Description: $2 \times 85^\circ$ Dees, Movable, short
 No. of Gaps/turn 4 dE/dn(max) 0.2 MeV/q
 Voltage (max) 0.05 MV Harmonic f_r/f_{ion} 2
 Freq 12-24 MHz Power in(max) 0.03 $\times 2$ MW
 Stability: Phase $\pm 0.2^\circ$ Voltage $\pm 5 \times 10^{-4}$

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_r/f_{ion}
 Freq MHz Power in(max) MW
 Stability: Phase Voltage

VACUUM SYSTEM

OPERATING PRESSURE: 2×10^{-8} Torr
 PUMPS: (No. and type) 1500 1/s TMP $\times 1$
 4000 1/s cryopump $\times 1$, 6500 1/s cryopump $\times 1$

ION SOURCE(S)

Type	Intensity (mA)	@ $\epsilon_n = \beta\gamma\epsilon$ (π mm mrad)	Ion Species
(a) ECR	0.05-0.2		P-Ar
(b) PIS	0.1		P-d
(c)			
(d)			

INJECTION SYSTEM

Axial, Solenoid, Spiral, inflector Efficiency 20-30 %

EXTRACTION SYSTEM

Deflector, Mag. chan., Passive focussing chan. Efficiency 40-70 %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μ A)	
		Internal	External
(a) P/d	4-14.5/4-9.5		10
(b) ^{12}C , ^{14}N , ^{16}O , ^{20}Ne	4-7		2
(c) ^{24}Mg , ^{27}Al	5-5		0.03
(d) ^{40}Ar	4.5-5.2		0.5

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

EXTRACTED BEAM PROPERTIES:

For μ A of 7.0 MeV/u $^{14}\text{N}^{7+}$ ions
 $\Delta E/E$ % $\Delta\phi$ (after stripping) $^\circ$ rf
 $\epsilon_n = \beta\gamma\epsilon \times 0.9 \pi$ mm mrad z 0.9 π mm mrad

FACILITIES FOR RESEARCH

Same as those of the RRC.

SHIELDED AREA: Fixed: m² Moveable m²

Target Stations: No. Served At Same Time:

MAGNETIC SPECTROMETERS:

OTHER FACILITIES:

REFERENCES/NOTES

(a) A.Goto et al.: Proc. 12th Int. Cyclo. Conf., 51 (1989)
 (b) A.Goto et al.: ibid., 439 (1989)

PLAN VIEW OF FACILITY, COMMENTS

This cyclotron is used as an injector of the RIKEN Ring Cyclotron (RRC).

Stand-alone use of this cyclotron is also made for isotopes production for Moessbauer spectroscopy and laser nuclear spectroscopy, production test of slow positrons, measurement of nuclear fusion cross sections, etc.