

ENTRY NO. CM17 Date October 5, 1995
 Machine Name 930 AVF CYCLOTRON
 Manufacturer Sumitomo Heavy Industries, Ltd.
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HISTORY AND STATUS

DATES: Design First Machine
 SALES: No. Sold/Operational 5 / 5 Currently Available Yes
 COST: Accelerator Facility

MAGNET

POLE PARAMETERS:
 Diameter 215.6 cm $R_{extract}$ 92.3 cm R_{inject} cm
 HILL PARAMETERS: Gap (min) cm B_{max} 1.96 T
 (@ 408,000 AT) Gap (max) 16.6 cm B_{min} 1.13 T
 VALLEY PARAMETERS: Gap (min) cm B_{max} T
 (@ 408,000 AT) Gap (max) 40.5 cm B_{min} T
 AVERAGE FIELD: $\langle B \rangle_{min}$ T $\langle B \rangle_{max}$ 1.64 T
 NUMBER OF SECTORS: compact/separated 4 /
 sector angle deg. spiral (max) 53 deg.
 FIELD TRIMMING: Trim Coils 12 pairs
 Harmonic Coils 8 pairs
 Other
 CURRENT: Main Coils 900 Amps Stability $\pm 1 \times 10^{-5}$
 Trim Coils 100-800 Amps Stability $\pm 2 \times 10^{-4}$
 Stored Energy (cryogenic) MJ
 WEIGHT: Iron 220 tons Conductor 9 tons
 ION ENERGY: Bending Limit $E/A = 110 q^2/A^2$ MeV/u
 Focusing Limit $E/A = 95 q/A$ MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:
 Description: 90° - 2 dees with $\lambda/4$ cavities
 No. of Gaps/turn 4 $dE/dn(max)$ 0.17 MeV/q
 Voltage (max) 0.060 MV Harmonic f_r/f_{ion} 1, 2, 3
 Freq 10.6-22.0 MHz Power in(max) 2×0.07 MW
 Stability: Phase ± 0.5 deg Voltage $\pm 1 \times 10^{-3}$

VACUUM SYSTEM

OPERATING PRESSURE: 5×10^{-7} Torr
 PUMPS: (No. and type) 4 cryo. pumps + 1 turbo. pump

ION SOURCE(S)

Type	Intensity (mA)	@	$\epsilon_n = \beta\gamma\epsilon$ (π mm mrad)	Ion Species
(a)	External (ECR or Multi-cusp)			
(b)				

INJECTION SYSTEM

Axial injection, Spiral inflector Efficiency 10-20 %

EXTRACTION SYSTEM

Electrostatic + Magnetic Efficiency 60-70 %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part. μ A)	
		Internal	External
(a) H^+	90	25	10
(b) D^+	35	68	41

EXTRACTED BEAM PROPERTIES:
 For μ A of 4.4 MeV/u Ar^{8+} ions
 $\Delta E/E$ 1.4 % $\Delta\phi$ 1.0 °rf
 $\epsilon_n = \beta\gamma\epsilon$ x 1.4 π mm mrad z 1.0 π mm mrad

REFERENCES/NOTES

Proc. of the Int. Conf. on Evolution in Beam Applications.
 (a) Takasaki, Japan, 1991, p. 270-274
 (b)