

**ENTRY NO:** C23  
**Date:** 28 Feb 2005 09:40:05  
**Machine Name:** RIKEN AVF CYCLOTRON  
**Institution:** RIKEN  
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**Person in Charge of Cyclotron:** Kase, M.  
**Person Reporting Information:** Kase, M.  
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#### History

**Designed by:** RIKEN/SHI  
**Construction Dates:** 1987-1989  
**First Beam Date:** April 1989

#### Characteristic Beams

	ions / energy(MeV/N)	current(pps)	power(w)
p	4-14.5	6e13	40-150
d	4-9.5	6e13	80-200
12C,14N,16O,20Ne	4-7	1e13	300
40Ar	4.5-5.2	3e12	100

#### Transmission Efficiency (source to extracted beam)

**Typical (%):** 10  
**Best (%):** 20

#### Emittance

**Emittance Definition:** RMS  
**Vertical (pi mm mrad):** 0.9  
**Horizontal (pi mm mrad):** 0.9  
**Longitudinal (dE/E[%] x RF[deg.]):**

#### USES

**Basic Research (%):** 14  
**Development (%):**  
**Therapy (%):**  
**Isotope Production (%):** 6  
**Other Application (%):** 81 (Injection to RRC C-23)  
**Maintenance (%):**  
**Beam Tuning (%):**  
**Total Time (h/year):** 3300

#### TECHNICAL DATA

##### (a)Magnet

**Type:** AVF  
**Kb (MeV):**  $70q^{**2}/A^{**2}$   
**Kf (MeV):**  
**Average Field (min./max. T):** 0.5-1.7  
**Number of Sectors:** 4  
**Hill Angular Width (deg.):**  
**Spiral (deg.):** 50  
**Pole Diameter (m):** 1.726  
**Injection Radius (m):** 0.0163  
**Extraction Radius (m):** 0.714  
**Hill Gap (m):** 0.128  
**Valley Gap (m):** 0.300  
**Trim Coils**  
**Number:** 9x2  
**Maximum Current (A-turns):** 70-300  
**Harmonic Coils**  
**Number:** 4xNsectorsx2  
**Maximum Current (A-turns):**  
**Main Coils**  
**Number:** 1x2  
**Total Ampere Turns:** 320000  
**Maximum Current (A):** 1113  
**Stored Energy (MJ):**  
**Total Iron Weight (tons):** 102  
**Total Coil Weight (tons):** 5.3  
**Power**  
**Main Coils (total KW):**  
**Trim Coils (total, maximum, KW):**  
**Refrigerator (cryogenic, KW):**

##### (b)RF

#### Acceleration

**Frequency Range (MHz):** 12-24  
**Harmonic Modes:** 2,3  
**Number of Dees:** 2  
**Number of Cavities:** 2  
**Dee Angular Width (deg.):**85  
**Voltage**  
**At Injection (peak to ground, KV):**  
**At Extraction (peak to ground, KV):**  
**Peak (peak to ground, KV):** 50  
**Line Power (max, KW):** 30\*2  
**Phase Stability (deg.):** +-0.2  
**Voltage Stability (%):** +-0.05

##### (c)Injection

**Ion Source:** ECR, PIS  
**Source Bias Voltage (kV):** Max. 10  
**External Injection:** axial  
**Buncher Type:** saw tooth(1,2,3f)  
**Injection Energy (MeV/n):**  
**Component:** solenoid, spiral inflector  
**Injection Efficiency (%):** 20-30  
**Injector:**

##### (d)Extraction

**Elements, Characteristic:** electrostatic deflector, magnetic channel, passive focusing channel efficiency  
**Typical Efficiency (%):** 40  
**Best Efficiency (%):** 70

##### (e)Vacuum

**Pumps:** 1500l/s TMP,400l/s cryogenic,6500l/s cryogenic  
**Achieved Vacuum (Pa):** 1.5e-10

**REFERENCES** A.Goto et.al., Proc. 12th Int. Cyclo. Conf. (1989) p51; A.Goto et.al., ibid, (1989) p439

#### EXPERIMENTAL FACILITIES

#### COMMENTS