

ENTRY NO:C19**Date:** 25 Feb 2005 05:23:48**Machine Name:** CYRIC AVF Cyclotron**Institution:** CYRIC : Cyclotron and Radioisotope Center, Tohoku University**Address:** Aramaki, Aoba, Sendai, 980-8578, Japan**Telephone:** +81-(0)22-795-7800**Fax:** +81-(0)22-795-7997**Web Address:** <http://www.cyric.tohoku.ac.jp/>**Person in Charge of Cyclotron:** T. Shinozuka**Person Reporting Information:** T. Shinozuka**E-mail Address:** shino@cyric.tohoku.ac.jp**History****Designed by:** Sumitomo Heavy Industry and CYRIC, Tohoku University**Construction Dates:** 1998 - 2000**First Beam Date:** March 6 2000**Characteristic Beams**p : 10-90(MeV), 10 μ A, 900(W)d : 10-55(MeV), 10 μ A, 900(W)4He : 20-110(MeV), 5 μ A, 250(W)H.I.: 12C4+, 6-12(MeV/u), 1 μ A, 40(W)H- : 10-50(MeV), 300 μ A(Goal), 15(kW)30 μ A(present), 1.5(kW)**Transmission Efficiency (source to extracted beam)**

Typical (%): 50

Best (%): 80

Emittance**Emittance Definition:** 90%**Vertical (pi mm mrad):** 12**Horizontal (pi mm mrad):** 15**Longitudinal (dE/E[%] x RF[deg.]):****USES**

Basic Research (%): 40

Development (%): 10

Therapy (%): 0

Isotope Production (%): 20

Other Application (%): 20

Maintenance (%): 5

Beam Tuning (%): 5

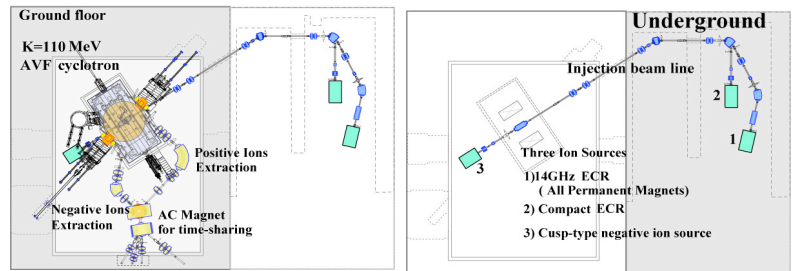
Total Time (h/year): 4030

TECHNICAL DATA**(a)Magnet****Type:** compact**Kb (MeV):** 110**Kf (MeV):** 90**Average Field (min./max. T):** 1.66/1.96**Number of Sectors:** 4**Hill Angular Width (deg.):****Spiral (deg.):** 53**Pole Diameter (m):** 2.16**Injection Radius (m):** 0.025**Extraction Radius (m):** 0.93**Hill Gap (m):** 0.166**Valley Gap (m):** 0.405**Trim Coils****Number:** 12x2(Upper and Lower)**Maximum Current (A-turns):** 1500**Harmonic Coils****Number:** 8x2(Upper and Lower)**Maximum Current (A-turns):** 1000**Main Coils****Number:** 1x2(Upper and Lower)**Total Ampere Turns:****Maximum Current (A):** 900**Stored Energy (MJ):****Total Iron Weight (tons):** 220**Total Coil Weight (tons):** 9**Power****Main Coils (total KW):** 230**Trim Coils (total, maximum, KW):** 80**Refrigerator (cryogenic, KW):****(b)RF****Acceleration****Frequency Range (MHz):** 10.6-22.0**Harmonic Modes:** 1st, 2nd and 3rd**Number of Dees:** 2**Number of Cavities:** 2**Dee Angular Width (deg.):** 86**Voltage****At Injection (peak to ground, KV):****At Extraction (peak to ground, KV):****Peak (peak to ground, KV):** 60**Line Power (max, KW):** 70 x 2 (2-Dees)**Phase Stability (deg.):** 0.5**Voltage Stability (%):** 0.1**(c)Injection****Ion Source:** 3 External sources (ECRx2, multi-cusp for H⁻)**Source Bias Voltage (kV):****External Injection:** axial**Buncher Type:** single gap, saw-tooth**Injection Energy (MeV/n):** 0.003-0.02**Component:** 90-deg. BM and other 3 BMs, Q-magnets(6), solenoid(4), spiral-injector**Injection Efficiency (%):** 30**Injector:****(d)Extraction****Elements, Characteristic:** ES-deflector, Magnetic-channel,

Gradient-corrector for positive ions and movable Stripper Foil for negative Hydrogen

Typical Efficiency (%): 60 for positive and 90 for negative**Best Efficiency (%):** 85**(e)Vacuum****Pumps:** CRYO x 4(4000 l/s for N₂), TMP(2000 l/s x6)**Achieved Vacuum (Pa):** 1.E-4**REFERENCES** T.Shinozuka, CYRIC annual report 2000 (2001) 19**EXPERIMENTAL FACILITIES**

10-target stations: short/long lived RI production, online mass-separator, fast-neutron time of facility, general-purpose, bio-physics etc., small Cyclotron (12 MeV proton) for PET RI production

COMMENTS

System for Heavy Charged-particle Beam Multi-purpose Use

