ENTRY NO:C19
Date: 25 Feb 2005 05:23:48
Machine Name: CYRIC AVF Cyclotron
Institution: CYRIC : Cyclotron and Radioisotope Center, Tohoku University
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Person in Charge of Cyclotron: T. Shinozuka
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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 μA, 900(W)
d	: 10-55(MeV),	10 μA, 900(W)
4He	: 20-110(MeV),	5 μA, 250(W)
H.I.:	12C4+, 6-12(MeV/u),	1 μA, 40(W)
H-	: 10-50(MeV),	300 μA(Goal), 15(kW)
		30 μA(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-inflector
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 N_2), 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