

ENTRY NO:C20

Date: 14 Feb 2005 18:24:58

Machine Name: JAERI AVF Cyclotron

Institution: Japan Atomic Energy Research Institute

Address: 1233 Watanuki, Takasaki, Gunma 370-1292, Japan

Telephone: +81-27-346-9630

Fax: +81-27-346-9690

Web Address: <http://www.jaeri.go.jp>

Person in Charge of Cyclotron: T. Nara

Person Reporting Information: W. Yokota

E-mail Address: [yokota@taka.jaeri.go.jp](mailto:yokota@taka.jaeri.go.jp)

### History

Designed by: Sumitomo Heavy Industries, Ltd.

Construction Dates: 1988-1991

First Beam Date: 17 March, 1991

### Characteristic Beams

H+	90 MeV/N	10 e-microA
4He2+	30	10
12C5+	18.3	1.0
40Ar13+	11.5	0.045
129Xe23+	3.5	0.20
197Au31+	2.5	0.038

### Transmission Efficiency (source to extracted beam)

Typical (%): 15

Best (%): 30

### Emittance

Emittance Definition: 80 %

Vertical (pi mm mrad): 13

Horizontal (pi mm mrad): 9

Longitudinal (dE/E[%] x RF[deg.]):

### USES

Basic Research (%): 17

Development (%): 4

Therapy (%): 0

Isotope Production (%): 2

Other Application (%): 56

Maintenance (%):

Beam Tuning (%): 21

Total Time (h/year): 3300

### TECHNICAL DATA

#### (a)Magnet

Type: compact

Kb (MeV): 110

Kf (MeV): 95

Average Field (min./max. T): 1.67

Number of Sectors: 4

Hill Angular Width (deg.):

Spiral (deg.): 53

Pole Diameter (m): 2.156

Injection Radius (m):

Extraction Radius (m): 0.923

Hill Gap (m): 0.166

Valley Gap (m): 0.405

#### Trim Coils

Number: 12 x 2

Maximum Current (A-turns): 800 A

#### Harmonic Coils

Number: 8 x 2

Maximum Current (A-turns): 50 A

#### Main Coils

Number: 1 x 2

Total Ampere Turns: 432000

Maximum Current (A): 900

#### Stored Energy (MJ):

Total Iron Weight (tons): 220

Total Coil Weight (tons): 5

#### Power

Main Coils (total KW): 250

Trim Coils (total, maximum, KW): 52

Refrigerator (cryogenic, KW):

#### (b)RF

### Acceleration

Frequency Range (MHz): 10.6-22.0

Harmonic Modes: 1,2,3

Number of Dees: 2

Number of Cavities: 2

Dee Angular Width (deg.): 86

### Voltage

At Injection (peak to ground, KV): 60

At Extraction (peak to ground, KV): 57

Peak (peak to ground, KV): 60

Line Power (max, KW): 50

Phase Stability (deg.): +0.5

Voltage Stability (%): +0.1

#### (c)Injection

Ion Source: Multi-cusp x 1, ECR x 2

Source Bias Voltage (kV): 3-20

External Injection: axial

Buncher Type: twin gaps, sine wave

Injection Energy (MeV/n):

Component:

Injection Efficiency (%):

Injector:

#### (d)Extraction

Elements, Characteristic:

electrostatic deflector:60kV, electromagnetic coil:1430A,

passive-type field gradient corrector

Typical Efficiency (%): 60

Best Efficiency (%): 95

#### (e)Vacuum

Pumps: cryo(4000L/s) x 2

TMP(2000L/s) x 2

Achieved Vacuum (Pa): 1.2e-5 Pa

### REFERENCES

Y.Nakamura, et. al, JAERI-Review 2004-025, pp.310-312 (2004)

K.Arakawa, et. al, Proc. 13th Int. Conf. on Cyclotrons and their Applications, pp.119-122 (1992)

### EXPERIMENTAL FACILITIES

Wide-area ion irradiation chamber

Positron emitting tracer imaging system (PETIS)

Heavy ion microbeam System

Quasi-monoenergetic neutron source

Beam chopping system (pulsed type + sinusoidal type)

Beam scanner

### COMMENTS

