

Entry: **C38**  
 Machine Name: JAERI AVF Cyclotron  
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**HISTORY**

Design by: 1986  
 Construction time: 1988-1991  
 First beam: March, 1991

**CHARACTERISTIC BEAMS**

ions / energy (MeV/n) / current (pps) / power (W) :  
 - H<sup>+</sup> 90MeV/n 10  $\mu$ A  
 - <sup>12</sup>C<sup>5+</sup> 18.3 0.25  
 - <sup>40</sup>Ar<sup>13+</sup> 11.5 0.03  
 - <sup>129</sup>Xe<sup>23+</sup> 3.5 0.2

transmission efficiency (total)  
 - typical: 14 % - best: 27 %  
 transverse emittance (rms)  
 - vertical: 13  $\pi$  mmmrad  
 - horizontal: 9  $\pi$  mmmrad  
 longitudinal emittance (rms)  $\Delta E/E$ .deg RF

**USES**

basic research: 25 % therapy: %  
 development: 11 % isotope production: 10 %  
 other applications: 40 % maintenance: %  
 beam tuning: 14 %  
 total time: 3300 h/year

**TECHNICAL DATA**

a) magnet  
 type: H  
 Kb: 110 MeV/A Kf: 95 MeV/A  
 average field (min-max): 1.67 T  
 number of magnet sectors: 4  
 - angle: deg  
 - spiral (max): 53 deg  
 pole parameters  
 - diameter: 2.16 m  
 - injection radius: m  
 - extraction radius: 0.923 m  
 hill gap: 0.166 m valley gap: 0.405 m  
 field trimming  
 - trim coils  
 - number: 12  
 - current (max): 800 A  
 - harmonic coils  
 - number: 8  
 - current (max): 50 A  
 - others  
 - number  
 - current (max): A  
 main coils:  
 - number: 1  
 - Ampere-turns: 432,000/2 coils A.T.  
 - current: 900 A  
 stored energy: MJ  
 weight: - iron: 220 t - coils: 9 t  
 power  
 - main coils (total): 250 kW  
 - trim coils (total max): 52 kW  
 - refrigerator (cryogenic): kW

**b) RF**

- acceleration  
 - frequency range: 10.6 - 22.0 MHz  
 - harmonic modes: 1, 2, 3  
 - number of dees: 2  
 - angular aperture: 86 deg  
 - voltage:- average (min-max): 60 kV  
 - variation with radius:  
 - power in (max): 50 kW  
 - stability: - phase:  $\pm 0.5$  deg - voltage:  $\pm 0.1$  %

**- other cavities**

- purpose:  
 - frequency range: MHz  
 - region of influence: m  
 - voltage (max): kV  
 - power in (max): kW  
 - stability:- phase: deg - voltage: %

**c) injection**

- internal source: CUSP, ECR  
 - external (radial/axial):  
 - elements:  
 - source voltage: 3 - 20 kV  
 - injection energy: MeV/n  
 - buncher:  
 - injection efficiency: %

**d) ion sources/injector**

Axial injection with spiral inflector

**e) extraction**

- elements, characteristics:  
 - Electrostatic deflector  
 - Electromagnetic coil  
 - Passive-type field gradient corrector

**- efficiency**

- typical: 58 % - best: 86 %

**f) vacuum**

- pumps: Cryogenic (4000 L/s) 4 sets  
 Turbo molecular (2000 L/s) 1 set  
 - achieved vacuum:  $2 \times 10^{-5}$  Pa

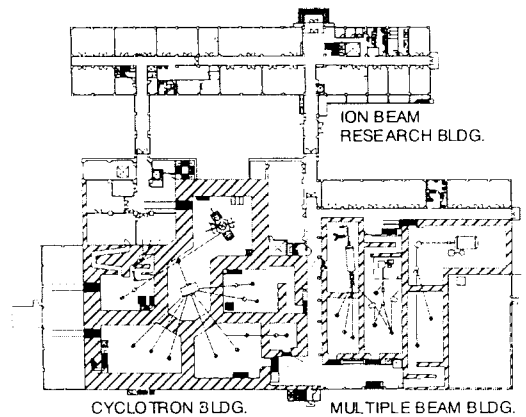
**REFERENCES**

1) K.Arakawa et al., JAERI-M report 93-047 (1993) pp. 1-54...  
 2) K.Arakawa et al., Proc. 13th Int. Conf. on Cyclotron and...  
 and their applications, (1992) 119

**EXPERIMENTAL FACILITIES**

On-line isotope separator,  
 Beam chopping system, Beam scanner,  
 Fast neutron production

**PLAN VIEW OF FACILITY**



**COMMENTS**

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