

**ENTRY NO:** C-22  
**Machine Name:** RIKEN AVF CYCLOTRON  
**Date:** 6/20/01 12:02:34 AM  
**Institution:** RIKEN  
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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 extract beam)

typical: 10% - best: 20%

## tranverse emittance

**emittance definition:** RMS

vertical:  $0.9\pi$  mm mrad

horizontal:  $0.9\pi$  mm mrad

longitudinal:  $(\Delta) E/E$  %xdeg RF

## USES

basic research: %      therapy: %  
development: %      isotope production: %  
other: %      maintenance: %  
beam tuning: %      Total Time: h/year

## TECHNICAL DATA

a)magnet:      type: AVF  
Kb:  $70q^{**2}/A^{**2}MeV/A$       Kf: MeV/A  
average field (min/max): 0.5-1.7 T  
number of magnet sectors: 4  
hill angular width: hill angular width  
spiral (max): 50 deg  
pole parameters  
diameter: 1.726 m  
injection radius: 0.0163 m  
extraction radius: 0.714 m  
hill gap: 0.128m      valley gap: 0.300m  
trim coils  
-number: 9x2  
-current(max): 70-300 A-turns  
harmonic coils  
-number: 4xNsectorsx2  
-current(max): A-turns  
main coils  
number: 1x2  
total ampere-turns: 320000 A-turns  
current: 1113 A  
stored energy: MJ  
weight - iron: 102t      coils: 5.3t  
power  
main coils (total): kW  
trim coils (total max): kW  
refrigerator (cryogenic): kW  
b)RF  
acceleration  
frequency range: 12-24MHz

harmonic modes: 2,3  
number of dees: 2  
number of cavities: 2  
dee angular width: 85degrees  
voltage  
at injection: kV(peak to ground, max)  
at extraction: kV(peak to ground, max)  
peak: 50kV(peak to ground, max)  
line power(max): 30\*2kW  
stability  
phase:  $\pm 0.2$  deg  
voltage:  $\pm 0.05\%$

## injection

c)ion source: ECR, PIS

external injection: axial

components: solenoid, spiral inflector

source bias voltage: Max. 10kV

injection energy: MeV/N

buncher: saw tooth(1,2,3f)

injection efficiency: 20-30%

## d)injector:

e)extraction

electrostatic deflector, magnetic channel,passive focusing channel

## efficiency

typical: 40%

best: 70%

## f)vacuum

pumps: 1500l/s TMP,400l/s cryogenic,6500l/s cryogenic

achieved vacuum:  $1.5e-10$ Pa

## REFERENCES

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

## EXPERIMENTAL FACILITIES

## COMMENTS