

**ENTRY NO:** C-23  
**Machine Name:** RIKEN RING CYCLOTRON  
**Date:** 6/20/01 12:31:33 AM  
**Institution:** RIKEN  
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## HISTORY

**Designed By:** RIKEN  
**Construction Dates:** 1980-1986  
**First Beam Date:** Dec 16, 1986

## CHARACTERISTIC BEAMS

ions	/ energy(MeV/N)	/current(pps)	/power(w)
p	210	2e11	60
d,12C,20Ne	135	1-3e12	
40Ar	24	1.3e13	2000
136Xe	26	6e11	350

## transmission efficiency(source to extract beam)

**typical:** 70% - **best:** 90%

## tranverse emittance

### emittance definition: RMS

**vertical:**  $0.7\pi$  mm mrad

**horizontal:**  $0.7\pi$  mm mrad

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

## USES

**basic research:** 70%      **therapy:** %  
**development:** %      **isotope production:** %  
**other:** %      **maintenance:** 15%  
**beam tuning:** 15%      **Total Time:** 6500h/year

## TECHNICAL DATA

**a)magnet:**      **type:** straight sector

**Kb:**  $540c^{**2}/A^{**2}MeV/A$       **Kf:** MeV/A

**average field (min/max):** 0.97 T

**number of magnet sectors:** 4

**hill angular width:** 50hill angular width

**spiral (max):** deg

## pole parameters

**diameter:** m

**injection radius:** 0.89 m

**extraction radius:** 3.56 m

**hill gap:** 0.08m      **valley gap:** m

## trim coils

-number:  $26*4x2$

-current(max): 230-600 A-turns

## harmonic coils

-number: xNsectorsx2

-current(max): A-turns

## main coils

**number:**  $4x2$

**total ampere-turns:** 128000 A-turns

**current:** 1072 A

**stored energy:** MJ

**weight - iron:** 2100t      **coils:** 16t

## power

**main coils (total):** kW

**trim coils (total max):** kW

**refrigerator (cryogenic):** kW

## b)RF

### acceleration

**frequency range:** 18-45MHz

**harmonic modes:** 5,9,10,11

**number of dees:** 2

**number of cavities:** 2

**dee angular width:** 23.5degrees

## voltage

at injection: kV(peak to ground, max)

at extraction: kV(peak to ground, max)

peak: 300kV(peak to ground, max)

**line power(max):**  $300*2kW$

## stability

**phase:**  $\pm 0.2$  deg

**voltage:**  $\pm 0.015\%$

## injection

**c)ion source:**

**external injection:** radial

**components:** magnetic channel, electrostatic channel

**source bias voltage:** kV

**injection energy:** 0.5-7MeV/N

## buncher:

**injection efficiency:** 70%

**d)injector:** 715 cyclotron, heavy ion linac

## e)extraction

electrostatic channel magnetic channel

## efficiency

**typical:** 80%

**best:** 100%

## f)vacuum

**pumps:**  $5000l/s(\text{cryogenic})^*4, 10000l/s(\text{cryogenic})^*10$

**achieved vacuum:**  $8e-11Pa$

## REFERENCES

Y.Yano Proc. 13th Int. Cyclo. Conf. (1992)p.102.

## EXPERIMENTAL FACILITIES

14 target stations: projectile fragment separator (RIPS)

QQD-QD spectrometer (SMART)

## COMMENTS