

ENTRY NO: C22
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Machine Name: RCNP Ring Cyclotron
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History

Designed by: RCNP Osaka University
Construction Dates: 1986-1991

First Beam Date: 1991

Characteristic Beams

	ions / energy(MeV/N)/current(pps)/power(w)
Proton	420 3x10 ¹²
3He	150 2.5x10 ¹²
4He	100 2.5x10 ¹²
18O ⁶⁺	60 3x10 ¹¹

Transmission Efficiency (source to extracted beam)

Typical (%): 80
Best (%): 100

Emittance

Emittance Definition: RMS
Vertical (pi mm mrad): 1
Horizontal (pi mm mrad): 1
Longitudinal (dE/E[%] x RF[deg.]): 0.1x10

USES

Basic Research (%): 42
Development (%): 27
Therapy (%):
Isotope Production (%):
Other Application (%):
Maintenance (%): 24
Beam Tuning (%): 7
Total Time (h/year): 6840

TECHNICAL DATA

(a)Magnet

Type: normal conductor separated sector

Kb (MeV): 400

Kf (MeV): 400

Average Field (min./max. T): 0.76

Number of Sectors: 6

Hill Angular Width (deg.): 22-27.5

Spiral (deg.): 30

Pole Diameter (m):

Injection Radius (m): 2.0

Extraction Radius (m): 4.0

Hill Gap (m): 0.06

Valley Gap (m):

Trim Coils

Number: 36x2

Maximum Current (A-turns): 8000

Harmonic Coils

Number: xNsectorsx2

Maximum Current (A-turns):

Main Coils

Number: 1x2

Total Ampere Turns: 1.45x10⁵

Maximum Current (A): 900

Stored Energy (MJ):

Total Iron Weight (tons): 2220

Total Coil Weight (tons): 32

Power

Main Coils (total KW): 450

Trim Coils (total, maximum, KW): 350

Refrigerator (cryogenic, KW):

(b)RF

Acceleration

Frequency Range (MHz): 30-52

Harmonic Modes: 6 and 10

Number of Dees: 3

Number of Cavities: 3

Dee Angular Width (deg.):

Voltage

At Injection (peak to ground, KV): 375

At Extraction (peak to ground, KV): 375

Peak (peak to ground, KV): 375

Line Power (max, KW): 750

Phase Stability (deg.): 0.1

Voltage Stability (%): 0.01

(c)Injection

Ion Source:

Source Bias Voltage (kV):

External Injection: axial

Buncher Type:

Injection Energy (MeV/n):

Component:

Injection Efficiency (%):

Injector: RCNP AVF Cyclotron

(d)Extraction

Elements, Characteristic: 2 deflector 2 magnetic channel efficiency

Typical Efficiency (%): 70

Best Efficiency (%): 100

(e)Vacuum

Pumps: 9 Cryo Pumps

Achieved Vacuum (Pa): 1.5x10⁻⁵

REFERENCES

EXPERIMENTAL FACILITIES

Magnetic Spectrometer 100 m TOF channel and 0-90 deg Beam Swinger

COMMENTS