

ENTRY NO: C-21
Machine Name: RCNP Ring Cyclotron
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Institution: Research Center for Nuclear Physics
Address 10-1, Mihogaoka, Ibaraki, Osaka, 567-0047, Japan
In Charge of Cyclotron: Prof. Kenji Sato
Telephone: +81-6-6879-8830
Fax: +81-6-6879-8899
Person Reporting: Dr. Shiro Ninomiya
Web: <http://www.rcnp.osaka-u.ac.jp/>
E-mail: ninomiya@rcnp.osaka-u.ac.jp

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 |
| 18O6+ | 60 3x10 ¹¹ |

transmission efficiency(source to extract beam)

typical: 80% - **best:** 100%

tranverse emittance

emittance definition: RMS

vertical: 1 π mm mrad

horizontal: 1 π mm mrad

longitudinal: 0.1x10(Δ) E/E)%xdeg RF

USES

basic research: 42% **therapy:** %
development: 27% **isotope production:** %
other: % **maintenance:** 24%
beam tuning: 7% **Total Time:** 6840h/year

TECHNICAL DATA

a)magnet: **type:** normal conductor separated sector

Kb: 400MeV/A **Kf:** 400MeV/A

average field (min/max): 0.76 T

number of magnet sectors: 6

hill angular width: 22-27.5hill angular width

spiral (max): 30 deg

pole parameters

diameter: m

injection radius: 2.0 m

extraction radius: 4.0 m

hill gap: 0.06m **valley gap:** m

trim coils

-number: 36x2

-current(max): 8000 A-turns

harmonic coils

-number: xNsectorsx2

-current(max): A-turns

main coils

number: 1x2

total ampere-turns: 1.45x10⁵ A-turns

current: 900 A

stored energy: MJ

weight - iron: 2220t **coils:** 32t

power

main coils (total): 450 kW

trim coils (total max): 350 kW

refrigerator (cryogenic): kW

b)RF

acceleration

frequency range: 30-52MHz

harmonic modes: 6 and 10

number of dees: 3

number of cavities: 3

dee angular width: degrees

voltage

at injection: 375kV(peak to ground, max)

at extraction: 375kV(peak to ground, max)

peak: 375kV(peak to ground, max)

line power(max): 750kW

stability

phase: 0.1 deg

voltage: 0.01%

injection

c)ion source:

external injection: axial

components:

source bias voltage: kV

injection energy: MeV/N

buncher:

injection efficiency: %

d)injector: RCNP AVF Cyclotron

e)extraction

2 deflector 2 magnetic channel

efficiency

typical: 70%

best: 100%

f)vacuum

pumps: 9 Cryo Pumps

achieved vacuum: 1.5x10⁻⁵Pa

REFERENCES

EXPERIMENTAL FACILITIES

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

Swinger

COMMENTS