

Entry: **C.39**
 Machine Name: SF Cyclotron
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HISTORY

Design by: Institute for Nuclear Study, Univ. of Tokyo
 Construction time: 1969-74
 First beam: 1974

CHARACTERISTIC BEAMS

ions / energy (MeV/n) / current (pps) / power (W) :
 - p / 35 // 350 W
 - 4He / 17 // 340 W
 - 6Li / 6.2 // 20 W
 - 16O / 35 // 110 W
 transmission efficiency (total)
 - typical: % - best: %
 transverse emittance (rms)
 - vertical: 13 π mmmrad
 - horizontal: 18 π mmmrad
 longitudinal emittance (rms) 0.03 $\Delta E/E$.deg RF

USES

basic research: 50 % therapy: %
 development: 5 % isotope production: 5 %
 other applications: % maintenance: 20 %
 beam tuning: 5 %
 total time: 3500 h/year

TECHNICAL DATA

a) magnet
 type:
 Kb: 68 MeV/A Kf: 48 MeV/A
 average field (min-max): 1.64 T
 number of magnet sectors: 3
 - angle: deg
 - spiral (max): 5 deg
 pole parameters
 - diameter: 1.68 m
 - injection radius: m
 - extraction radius: 0.73 m
 hill gap: 0.146 m valley gap: 0.228 m
 field trimming
 - trim coils
 - number: 11
 - current (max): 250-450 A
 - harmonic coils
 - number: 7
 - current (max): A
 - others
 - number:
 - current (max): A
 main coils:
 - number:
 - Ampere-turns: A.T.
 - current: 600 A
 stored energy: MJ
 weight : - iron: 130 t - coils: 5 t
 power
 - main coils (total): 260 kW
 - trim coils (total max): kW
 - refrigerator (cryogenic): kW

b) RF

- acceleration
 - frequency range: 7.4-22.5 MHz
 - harmonic modes: 1,3,5
 - number of dees: 1
 - angular aperture: 180 deg
 - voltage: - average (min-max): < 70 kV
 - variation with radius:
 - power in (max): 150 kW
 - stability: - phase: 1 deg - voltage: 0.02 %

- other cavities

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

c) injection

- internal source: yes
 - external (radial/axial): axial injection
 - elements: electrostatic mirror
 - source voltage: 12 kV
 - injection energy: MeV/n
 - buncher: sinusoidal
 - injection efficiency: 15 %

d) ion sources/injector

PIG/cold cathode PIG/internal
 ECR external

e) extraction

- elements, characteristics:
 - 2 channel deflectors
 - efficiency
 - typical: 50 % - best: 90 %

f) vacuum

- pumps: 36" and 10" oil diffusion
 - achieved vacuum: 0.0002 Pa

REFERENCES

Proc. 7th Cyclotron Conf. p 100 and 312 (1975)

EXPERIMENTAL FACILITIES

QDD magnetic spectrometer, Garis, 80 cm scattering chamber

PLAN VIEW OF FACILITY

COMMENTS