

ENTRY NO: CU-14
Machine Name: NIRS-Chiba Isochronous Cyclotron
Date: 5/30/01 3:33:35 AM
Institution: National Institute of Radiological Sciences
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HISTORY

Designed By: CGR-MeV (Thomson-CSF)
Construction Dates: 1972-1973
First Beam Date: Dec. 1973

CHARACTERISTIC BEAMS

ions	/ energy(MeV/N)/current(pps)/power(w)
p	6-70 <1.2E+14 700
d	6 - 25 <1E+15 750
3He	6 - 48 <3E+14 700
4He	6 - 25 <6E+14 1000
12C	6 - 12 <6E+11 15

transmission efficiency(source to extract beam)

typical: 15% - best: 30%

transverse emittance

emittance definition: RMS

vertical: 12π mm mrad

horizontal: 15π mm mrad

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

USES

basic research: 8% therapy: 7%
 development: 5% isotope production: 17%
 other: 38% maintenance: 10%
 beam tuning: 15% Total Time: 1302h/year

TECHNICAL DATA

a)magnet: type: Spiral Sector
 Kb: 110MeV/A Kf: 90MeV/A
 average field (min/max): 1.65/0.7 T
 number of magnet sectors: 4
 hill angular width: hill angular width
 spiral (max): 53 deg
 pole parameters
 diameter: 2.15 m
 injection radius: 0.02 m
 extraction radius: 0.92 m
 hill gap: 0.166m valley gap: 0.405m
 trim coils
 -number: 12x2
 -current(max): 1500 A-turns
 harmonic coils
 -number: 4xNsectorsx2
 -current(max): 1000 A-turns
 main coils
 number: 1x2
 total ampere-turns: 3.6E+5 A-turns
 current: 1100 A
 stored energy: MJ
 weight - iron: 200t coils: t
 power
 main coils (total): 360 kW
 trim coils (total max): 80 kW
 refrigerator (cryogenic): kW
 b)RF
 acceleration
 frequency range: 10.6-21MHz

harmonic modes: 2
 number of dees: 2
 number of cavities: 2
 dee angular width: 86degrees
 voltage
 at injection: kV(peak to ground, max)
 at extraction: kV(peak to ground, max)
 peak: kV(peak to ground, max)
 line power(max): kW
 stability
 phase: 0.5 deg
 voltage: 0.1%
 injection
 c)ion source: PIG
 external injection: axial
 components: ES-Q, BM, Solenoid
 source bias voltage: 10kV
 injection energy: 0.02MeV/N
 buncher: Double-gap
 injection efficiency: 80%
 d)injector: Spiral type
 e)extraction
 a) Electro-static Deflector b) Magnetic-channel c) Gradient-corrector
 efficiency
 typical: 75%
 best: 85%
 f)vacuum
 pumps: TMP(6x2000l/s) + CRYO(2)
 achieved vacuum: 1E-4Pa
REFERENCES
 a) H.Ogawa et al. IEEE Trans. NS-26,No2 (1978)1998 b) T.Yamada et al. Proc.11th Int.Conf.on Cyclo (1986)61 c) T.Honma et al. Proc.15th Int.Conf.on Cyclo (1998)621
EXPERIMENTAL FACILITIES
 a) Proton Therapy Facility b) Short-lived R.I.Production Facility c) Long-lived R.I.Production Facility d) Fast neutron Irradiation Facility e) General purpose Irradiation Facility
COMMENTS

