

**ENTRY NO:**CU13**Date:** 7 Feb 2005 11:56:12**Machine Name:** NIRS-Chiba Isochronous Cyclotron  
**Institution:** NIRS: National Institute of Radiological Science**Address:** Anagawa, Inage-ku, Chiba, 263-8555, Japan**Telephone:** +81-(0)43-206-3173**Fax:** +81-(0)43-206-6146**Web Address:****Person in Charge of Cyclotron:** S.Yamada**Person Reporting Information:** T.Honma**E-mail Address:** honma\_t@nirs.go.jp**History****Designed by:** Thomson-CSF (CGR-MeV)**Construction Dates:** 1972-1973**First Beam Date:** Dec. 1973**Characteristic Beams**

p : 6-70(MeV), 1.2E+14(pps), 700(W)

d : 6-25(MeV/u), 2.E+14(pps), 900(W)

3He : 6-48(MeV/u), 3.E+13(pps), 700(W)

4He : 6-25(MeV/u), 3.E+13(pps), 700(W)

H.I.: 12C4+, 6-12(MeV/u), 7.E+12(pps), 700(W)

**Transmission Efficiency (source to extracted beam)**

Typical (%): 50

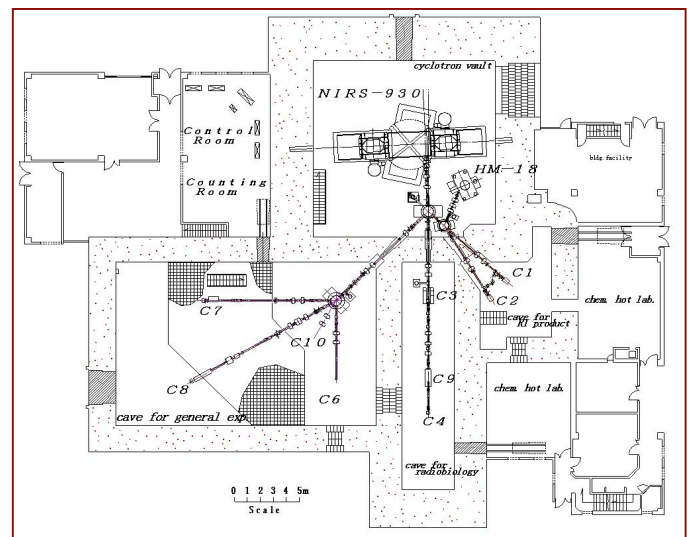
Best (%): 80

**Emittance****Emittance Definition:** 90**Vertical (pi mm mrad):** 12**Horizontal (pi mm mrad):** 15**Longitudinal (dE/E[%] x RF[deg.]):****USES****Basic Research (%):** 15**Development (%):** 5**Therapy (%):** 0**Isotope Production (%):** 40**Other Application (%):** 15**Maintenance (%):** 10**Beam Tuning (%):** 15**Total Time (h/year):** 1600**TECHNICAL DATA****(a)Magnet****Type:** compact**Kb (MeV):** 110**Kf (MeV):** 90**Average Field (min./max. T):** 0.35/1.65**Number of Sectors:** 4**Hill Angular Width (deg.):****Spiral (deg.):** 53**Pole Diameter (m):** 2.15**Injection Radius (m):** 0.025**Extraction Radius (m):** 0.93**Hill Gap (m):** 0.166**Valley Gap (m):** 0.405**Trim Coils****Number:** 12x2(Upper and Lower)**Maximum Current (A-turns):** 1500**Harmonic Coils****Number:** 8x2(Upper and Lower)**Maximum Current (A-turns):** 1000**Main Coils****Number:** 1x2(Upper and Lower)**Total Ampere Turns:** 3.6E+5**Maximum Current (A):** 1100**Stored Energy (MJ):****Total Iron Weight (tons):** 200**Total Coil Weight (tons):****Power****Main Coils (total KW):** 360**Trim Coils (total, maximum, KW):** 80**Refrigerator (cryogenic, KW):****(b)RF****Acceleration****Frequency Range (MHz):** 10.7-21**Harmonic Modes:** 1st and 2nd**Number of Dees:** 2**Number of Cavities:** 2**Dee Angular Width (deg.):** 86**Voltage****At Injection (peak to ground, KV):****At Extraction (peak to ground, KV):****Peak (peak to ground, KV):** 40**Line Power (max, KW):** 60x2(2-Dees)**Phase Stability (deg.):** 0.5**Voltage Stability (%):** 0.1**(c)Injection****Ion Source:** PIG(for internal), ECR(for external)**Source Bias Voltage (kV):****External Injection:** axial**Buncher Type:** double gap, sin-wave**Injection Energy (MeV/n):** 0.003-0.02**Component:** 90-deg. BMx2, ESQ-doublet, ESQ-triplet, solenoid(4), spiral-inflector**Injection Efficiency (%):** 30**Injector:****(d)Extraction****Elements, Characteristic:** ES-deflector, Magnetic-channel,

Gradient-corrector

**Typical Efficiency (%):** 60**Best Efficiency (%):** 85**(e)Vacuum****Pumps:** TMP(2000 l/s x6), CRYO x2**Achieved Vacuum (Pa):** 2.E-4**REFERENCES** H.Ogawa,et.al, IEEE Trans. NS26-No2, (1978)p1988**EXPERIMENTAL FACILITIES**

9-target stations: short/long lived RI production, fast-neutron, general-purpose, bio-physics, etc.

**COMMENTS****(b)RF****Acceleration**