

ENTRY NO:C03
Date: 1 Apr 2005 17:00:00
Machine Name: TRIUMF Cyclotron
Institution: TRIUMF
Address: 4004 Wesbrook Mall, Vancouver BC V6T 2A3, Canada
Telephone: 604-222-1047
Fax: 604-222-1074
Web Address: www.triumf.ca
Person in Charge of Cyclotron: Roger Poirier
Person Reporting Information: Glen Stinson
E-mail Address: stinson@triumf.ca

History

Designed by: in house, various engineering firms
Construction Dates: April 1968 to December 1975
First Beam Date: December 14, 1975

Characteristic Beams

p+	180 - 520 MeV	210 uA
p+	65 - 115 "	100 uA
p+ (pol)	180 - 520 "	25 uA

Transmission Efficiency (source to extracted beam)

Typical (%): 63
Best (%): 67

Emittance

Emittance Definition:
Vertical (pi mm mrad): 2
Horizontal (pi mm mrad): 2
Longitudinal (dE/E[%] x RF[deg.]): 0.2

USES

Basic Research (%): 86 (see comments)
Development (%): 2
Therapy (%): 2
Isotope Production (%): 45
Other Application (%): 4
Maintenance (%): 9
Beam Tuning (%): 2
Total Time (h/year): 5300

TECHNICAL DATA

(a)Magnet

Type: Section focused, laminated low carbon steel
Kb (MeV):
Kf (MeV):
Average Field (min./max. T): 0.3 - 0.46
Number of Sectors: 6
Hill Angular Width (deg.): 35 at inner 200 inches
Spiral (deg.): 70
Pole Diameter (m): 17.17
Injection Radius (m): 0.25
Extraction Radius (m): 3.8 to 7.90
Hill Gap (m): 0.528
Valley Gap (m):
Trim Coils
Number: 54
Maximum Current (A-turns): 7000
Harmonic Coils
Number: 13xN sectors x 2
Maximum Current (A-turns): 300
Main Coils
Number: 1 x 2
Total Ampere Turns: 552,000
Maximum Current (A): 18,400
Stored Energy (MJ): 16.5
Total Iron Weight (tons): 4400
Total Coil Weight (tons): 170
Power
Main Coils (total KW): 1380
Trim Coils (total, maximum, KW): 68
Refrigerator (cryogenic, KW):

(b)RF

Acceleration

Frequency Range (MHz): 23.05

Harmonic Modes: 5
Number of Dees: 2
Number of Cavities:
Dee Angular Width (deg.): 180
Voltage
At Injection (peak to ground, KV): 96
At Extraction (peak to ground, KV): 96
Peak (peak to ground, KV): 96
Line Power (max, KW):
Phase Stability (deg.): +/- 5
Voltage Stability (%): 0.0004

(c)Injection

Ion Source: CUSP, polarized (Lamb shift, optically pumped)
Source Bias Voltage (kV): 12
External Injection: axial injector elements : spiral inflector electrostatic transport
Buncher Type: 2
Injection Energy (MeV/n): 0.300
Component:
Injection Efficiency (%): 95
Injector:

(d)Extraction

Elements, Characteristic: Stripping in pyrolytic graphites with simultaneous extraction to 4 beamlines
Typical Efficiency (%): 99.95
Best Efficiency (%):

(e)Vacuum

Pumps: 2 He cooled cryo-panels (2.8 m square), 6 cryo-pumps, 2 turbo pumps
Achieved Vacuum (Pa): 6.7×10^{-8}

REFERENCES

EXPERIMENTAL FACILITIES

proton therapy, proton irradiation, RIB source and accelerator (ISAC), pion production targets (10+8 pps), proton reaction targets.

COMMENTS Total percentage usage is greater than 100% because several facilities can operate simultaneously.