

ENTRY NO: C39
Date: 16 Feb 2005 14:33:59
Machine Name: iThemba LABS Separated-Sector Cyclotron
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History

Designed by: National Accelerator staff
Construction Dates: 1979 - 1985
First Beam Date: October 1985

Characteristic Beams

ions / energy(MeV/N)	current(pps)	power(w)
p 200	1.87e13	600
p 66	6.24e14	6600
1804+	4.7	3.1e11
129Xe22+	6.1	1.4e10
		39.5

Transmission Efficiency (source to extracted beam)

Typical (%): 99.8
Best (%): 100

Emittance

Emittance Definition: RMS
Vertical (pi mm mrad): 2.7
Horizontal (pi mm mrad): 0.8
Longitudinal (dE/E[%] x RF[deg.]): 0.07

USES

Basic Research (%): 17
Development (%): 0.8
Therapy (%): 16
Isotope Production (%): 27.7
Other Application (%): 0
Maintenance (%): 17
Beam Tuning (%): 8.5
Total Time (h/year): 8477

TECHNICAL DATA

(a)Magnet

Type: sector magnets
Kb (MeV): 200
Kf (MeV): 200
Average Field (min./max. T): 0.517 (0/1.2560)
Number of Sectors: 4
Hill Angular Width (deg.): 34
Spiral (deg.): 0
Pole Diameter (m): 4.43
Injection Radius (m): 0.952
Extraction Radius (m): 4.156
Hill Gap (m): 0.066
Valley Gap (m): inf
Trim Coils

Number: 29x2
Maximum Current (A-turns): 500

Harmonic Coils

Number: 2xNsectorsx2
Maximum Current (A-turns):

Main Coils

Number: 1x2
Total Ampere Turns: 80 000
Maximum Current (A): 1600
Stored Energy (MJ): 1.5
Total Iron Weight (tons): 1400
Total Coil Weight (tons): 5.8

Power

Main Coils (total KW): 650
Trim Coils (total, maximum, KW):
Refrigerator (cryogenic, KW):

(b)RF

Acceleration

Frequency Range (MHz): 6 - 26
Harmonic Modes: 4 and 12
Number of Dees: 2
Number of Cavities: 4
Dee Angular Width (deg.): 49
Voltage
At Injection (peak to ground, KV): 184
At Extraction (peak to ground, KV): 230
Peak (peak to ground, KV): 230
Line Power (max, KW): 2x80
Phase Stability (deg.): 0.1
Voltage Stability (%): 0.1

(c)Injection

Ion Source:
Source Bias Voltage (kV):
External Injection: radial
Buncher Type: Double-gap, sine wave
Injection Energy (MeV/n): 1.4 - 8
Component: 2 bending magnets, 1 magnetic inflection channel
Injection Efficiency (%): 100
Injector: Solid pole injector cyclotrons SPC1 and SPC2

(d)Extraction

Elements, Characteristic: 2 septum magnets
Typical Efficiency (%): 99.8
Best Efficiency (%): 100

(e)Vacuum

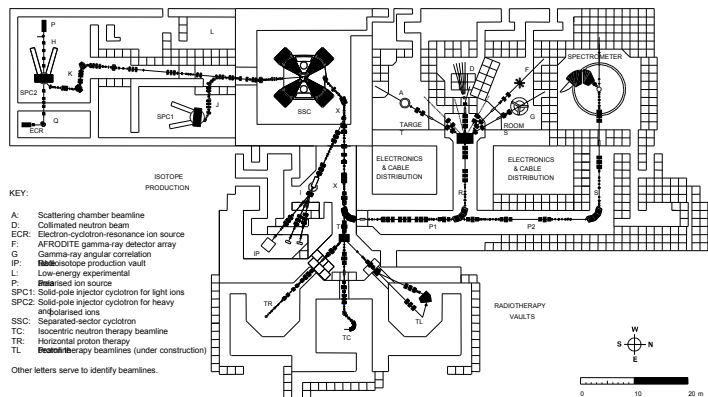
Pumps: 4 Rotary vane 120 cub m/h, 4 Roots 350 cub m/h, 6
Achieved Vacuum (Pa): 7e-5

REFERENCES Proc. 11th Conf. on Cyclotrons and their Appl.(1986)p6 Proc. 12th Conf. on Cyclotrons and their Appl.(1989)p80

EXPERIMENTAL FACILITIES

A 66 MeV isocentric gantry for neutron therapy, a fixed horizontal beamline for proton therapy, a high-energy gamma-ray detectors array AFRODITE, a 1.5m scattering chamber, a neutron beam facility, a triple-arm gamma-correlation table and a K600 QDD magnet spectrometer

COMMENTS



(b)RF

Acceleration