

ENTRY NO: C38
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Machine Name: iThemba LABS Injector Cyclotron 2
Institution: iThemba LABS
Address: P. O. Box 722, Somerset West, 7129, South Africa
Telephone: 27 21 8431000
Fax: 27 21 8433525
Web Address: http://www.tlabs.ac.za
Person in Charge of Cyclotron: J.L. Conradie
Person Reporting Information: J.L. Conradie
E-mail Address: lowry@tlabs.ac.za

History

Designed by: National Accelerator staff
Construction Dates: 1989 - 1993
First Beam Date: December 1993

Characteristic Beams

ions / energy(MeV/N)/current(pps)/power(w)			
p 3.	15	5.1e14	258
p 8.	0.8	2e13	104
40Ar8+	0.36	2.1e12	40
129Xe22+	0.32	5.7e10	8

Transmission Efficiency (source to extracted beam)

Typical (%): 15
Best (%): 30

Emittance

Emittance Definition: RMS
Vertical (pi mm mrad): 10
Horizontal (pi mm mrad): 15
Longitudinal (dE/E[%] x RF[deg.]): 0.042

USES

Basic Research (%): 80
Development (%): 9
Therapy (%): 0.5
Isotope Production (%): 0.5
Other Application (%):
Maintenance (%): 3
Beam Tuning (%): 7
Total Time (h/year): 4000

TECHNICAL DATA

(a)Magnet

Type: sector magnets
Kb (MeV): 8
Kf (MeV): 8
Average Field (min./max. T): 0.3-1.0
Number of Sectors: 4
Hill Angular Width (deg.): 45
Spiral (deg.):
Pole Diameter (m): 1.16
Injection Radius (m):
Extraction Radius (m): 0.476
Hill Gap (m): 0.156
Valley Gap (m): 0.250

Trim Coils

Number: 6x2
Maximum Current (A-turns): 200

Harmonic Coils

Number: 2xNsectorsx2
Maximum Current (A-turns): 20

Main Coils

Number: 1x2
Total Ampere Turns: 154560
Maximum Current (A): 690
Stored Energy (MJ): 0.1
Total Iron Weight (tons): 54.5
Total Coil Weight (tons): 1.85

Power

Main Coils (total KW): 46
Trim Coils (total, maximum, KW): 12
Refrigerator (cryogenic, KW):

(b)RF

Acceleration

Frequency Range (MHz): 8.6 - 26

Harmonic Modes: 2 and 6

Number of Dees: 2

Number of Cavities: 4

Dee Angular Width (deg.): 90

Voltage

At Injection (peak to ground, KV):

At Extraction (peak to ground, KV):

Peak (peak to ground, KV): 60

Line Power (max, KW): 2x25

Phase Stability (deg.): 0.1

Voltage Stability (%): 0.1

(c)Injection

Ion Source: ECR and Polarized ion source

Source Bias Voltage (kV): 9 - 20

External Injection: axial

Buncher Type: Double-gap, sine wave

Injection Energy (MeV/n): 1.4e-3 - 20e-3

Component: 3 spiral inflectors (interchangeable)

Injection Efficiency (%): 55 - 70

Injector:

(d)Extraction

Elements, Characteristic: electrostatic channel, 2 x magnetic channels

Typical Efficiency (%): 70

Best Efficiency (%): 90

(e)Vacuum

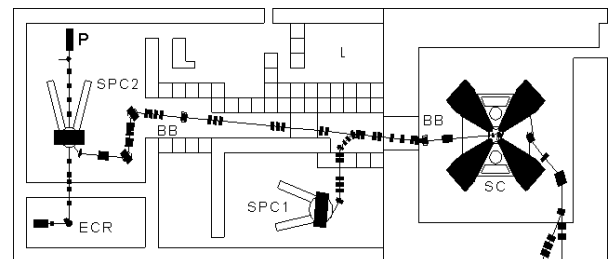
Pumps: turbo 2.2 cub m/s, cryopump 10 cub m/s and 2 LN cr

Achieved Vacuum (Pa): 1.7e-5

REFERENCES Proc. 11th Int. Conf. on Cyclotrons and their Appl.(1986)515 Proc. 15th Int. Conf. on Cyclotrons and their Appl.(1998)625

EXPERIMENTAL FACILITIES

COMMENTS



BB Beamline buncher
 ECR ECR ion source (basement)
 L Low energy experimental area
 P Polarized ion source (basement)
 SPC1 Solid pole injector for light ions
 SPC2 Solid pole injector for heavy or polarized ions
 SC Separated-sector cyclotron