

ENTRY NO. 9
 NAME OF MACHINE The Cyclotron Corporation CP-42
 INSTITUTION TRIUMF
 ADDRESS 4004 Wesbrook Mall, Vancouver, B.C. Canada, V6T 2A3
 TEL (604) 228-4711 TELEX 04-508503
 IN CHARGE J.J. Burgerjon REPORTED BY J.J. Burgerjon

HISTORY AND STATUS

DESIGN, date Mid. 1977 Model tests
 ENG DESIGN, date Mid. 1977
 CONSTRUCTION, date September 1978
 FIRST BEAM, date (actual) July 1979
 MAJOR ALTERATIONS

COST, ACCELERATOR Can. \$2,500,000.
 COST, FACILITY, total
 FUNDED BY Atomic Energy of Canada Ltd., Radio-Chemical Co.

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 7 ENGINEERS 2
 TECHNICIANS 7 CRAFTS
 GRAD STUDENTS involved during year
 OPERATED BY Research staff or Operators
 OPERATION 100 hr/wk. On target 80 hr/wk
 TIME DISTR. in house % Outside %
 BUDGET, op & dev Can. \$600,000
 FUNDED BY AECL Radio-Chemical Co.

RESEARCH

used for
 Radio-Isotope
 Production for AECL
 and Positron Emission Tomograph

MAGNET

POLE FACE, diameter (compact) 120 cm, R extraction 28-52cm
 R injection cm
 GAP, min 5 cm, Field 24 kG }
 min 12 cm, Field 16 kG } at 92,400
 AVERAGE FIELD at R ext 18.4 kG } Ampere turns
 B max / < B > 1.3 }
 NUMBER OF SECTORS { compact 3 } Spiral, max 64. deg
 { separated }
 SECTOR ANGLE (SSC) deg
 TRIMMING COILS

CONDUCTOR, material and type Hollow copper
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 100 max, kW; current stability 10⁻⁵
 trimming coils max, kW; current stability
 WEIGHT: Fe 35 tons; coils 3 tons
 COOLING system Chilled recirculated water
 ION ENERGY (bending limit) E/A = 42 q/a² MeV/amu
 (focusing limit) E/A = q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 2 Angle 90 deg
 BEAM APERTURE 1.8 cm; DC Bias 1.5 kV
 TUNED by, coarse fine Dee capacitor
 RF to 26.8 MHz, stable ± 0.5 KHz
 Orb F to 26.8 MHz
 HARMONICS, RF/Orb F, used 1
 DEE-Gnd, max 35 kV, min gap 0.5 cm
 STABILITY, (pk-pk noise)/(pk RF volt) 10⁻⁴
 ENERGY GAIN, max 100 kV/turn
 RF PHASE, stable to ± deg
 RF POWER input, max 100 kW
 FREQUENCY MODULATION, rate /s
 modulator, type
 beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 6 x 10⁻⁶ H₂ Torr or mbar
 PUMPS, No, Type, Size
 Four 30 cm DIA diffusion pumps
 L.N.-cooled "cold-finger"

ION SOURCES

PIG

INJECTION SYSTEM

EXTRACTION SYSTEM H⁻ stripping foil

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 260 m²; movable m²
 TARGET STATIONS 4 in 2 rooms
 STATIONS served at same time, max 1
 MAG SPECTROGRAPH, type
 COMPUTER model
 OTHER FACILITIES

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (µA)	
	Goal	Achieved	Internal	External
H ⁻	11-42	11-42	200	
H ⁺		12-41		200

SECONDARY (part/s)

BEAM PROPERTIES

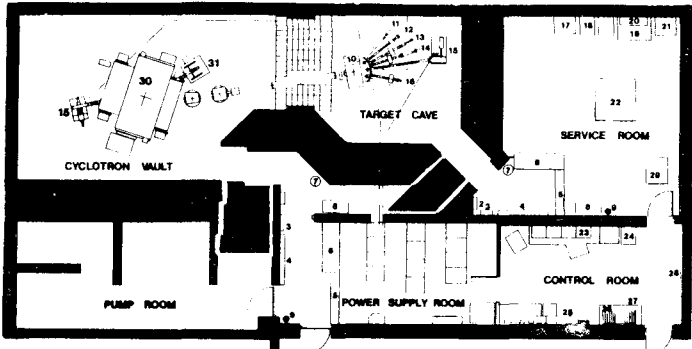
MEASURED CONDITIONS
 PULSE WIDTH 40 RF deg 200 µA of 42 MeV H⁺ ions
 PHASE EXC. max RF deg µA of MeV ions
 EXTRACT eff 100% µA of MeV ions
 RESOL ΔE/E 18% µA of MeV ions
 EMITTANCE { 40 axial } µA of MeV
 { 4 rad }

OPERATING PROGRAMS, time distribution
 BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS
 BIOMEDICAL APPLICAT 7% ISOTOPE PRODUCTIONS 93%

REFERENCES/NOTES

G.O. Hendry et al. "Design and Performance of a compact H⁻Cyclotron", Proc. 9th Int. Conf. on Cyclotrons, P. 125 (1981)

PLAN VIEW OF FACILITY AS PLANNED BY NOVEMBER 1984



1. Target Cave Shielding Door
2. Key Station
3. Monitor Stations (2)
4. Coat Racks (2)
5. Foot Barriers Storage For Rubbers (2)
6. Counter With Storage For Tools (2)
7. Low Activity Waste Bins (2)
8. Moveable Lead Glass Shielded Workstations
9. Fire Extinguishers (2)
10. Switching Magnet
11. C-11 Gas Target
12. I-123 Gas Target
13. F-18 Gas Target
14. N-13 Gas Target
15. Solid Target Station (2)
16. O-15 Target
17. Power Supply For Switching Magnet
18. Solid Target Station Control Equipment
19. Access Control No-Break Power Supply
20. No-Break Power Supply Batteries
21. Access Control Equipment
22. HotCell For Target and Equipment Handling
23. Controls For Beamline Monitors
24. Solid Target Stations Controls
25. Bookcase For Documentation
26. Storage For Circuit Diagrams
27. Table For Circuit Diagrams
28. Bulletin Board
29. Emergency Exit Hatch
30. Cyclotron
31. Gas Target