

ENTRY NO. 11

NAME OF MACHINE The Cyclotron Corporation CP-42
 INSTITUTION TRIUMF
 ADDRESS 4004 Wesbrook Mall
 TEL (604)222-1047 TELEX 04-508503
 IN CHARGE J.J. Burgerjon REPORTED BY Z. Gelbart

HISTORY AND STATUS

DESIGN, date Mid 1977 Model tests
 ENG DESIGN, date Mid. 1977
 CONSTRUCTION, date September 1978
 FIRST BEAM, date (or goal) July 1979
 MAJOR ALTERATIONS Target cave completed
 October 1985
 COST, ACCELERATOR Can. \$2,500,000.
 COST, FACILITY, total
 FUNDED BY Atomic Energy of Canada Ltd., Radio-Chemical

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT Co.

SCIENTISTS ENGINEERS 2
 TECHNICIANS 7 CRAFTS
 GRAD STUDENTS involved during year
 OPERATED BY Research staff or X 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 STAFF, not included above
 USERS, in house outside used for
 GRAD STUDENTS involved during year Radio-Isotope
 RESEARCH BUDGET, in house Production for AECL
 FUNDED BY and Positron Emission Tomograph.

MAGNET

POLE FACE, diameter (compact) 120 cm, R-extraction 28-52 cm
 R injection cm
 GAP, min 5 cm, Field 24 kG
 max 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 q²/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 kV, min gap 0.5 cm
 STABILITY, (pk-pk noise)/(pk RF volt) 10
 ENERGY GAIN, max 100 kV/turn
 RF PHASE, stable to \pm deg
 RF POWER input, max. 100 kW
 FREQUENCY MODULATION, rate /s
 modulator, type
 beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 6×10^{-6} 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 94 m²; movable m²
 TARGET STATIONS 9 in 2 rooms rooms
 STATIONS served at same time, max 1
 MAG SPECTROGRAPH, type
 COMPUTER model
 OTHER FACILITIES

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (μ A)	
	Goal	Achieved	Internal	External
H ⁻	11-42	11-42	200	
H ⁺		12-41		200
SECONDARY				(part/s)

BEAM PROPERTIES

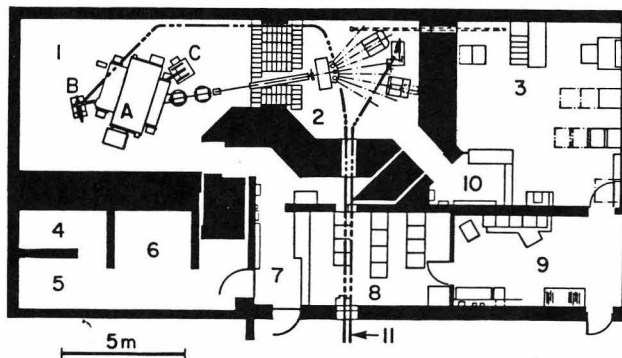
MEASURED CONDITIONS
 PULSE WIDTH 40 RF deg 200 μ A of 42 MeV H⁺ ions
 PHASE EXC. max RF deg μ A of MeV ions
 EXTRACT eff. 100. % μ A of MeV ions
 RESOL $\Delta E/E$ % μ A of MeV ions
 EMITTANCE
 (π mm-mrad) ~ 40 axial μ A of MeV
 ~ 4 rad

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

REFERENCES/NOTES

- 1) 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, COMMENTS, ETC.



- 1) Cyclotron vault, 1A) cyclotron, 1B) 27 MeV solids target station, 1C) 26 MeV gas target, 2) variable energy target cave, 3) service room, 4) active waste storage, 5) active waste holding tank, 6) cooling equipment, 7,10) personnel change and monitoring areas, 8) power supply room, 9) control room, 11) rabbit tubes to radiochemistry hot cells.