

ENTRY No. FM-1 McGill Synchrocyclotron DATE April 19, 1989
 NAME OF MACHINE McGill University
 INSTITUTION McGill University
 ADDRESS 3610 University Street, Montréal, Québec H3A 2B2 CANADA
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 IN CHARGE Prof. Jean Barrette REPORTED BY Mr. Leo Nikkinen

HISTORY AND STATUS

DESIGN, date 1945 Model tests
 ENG DESIGN, date 1945 - 1946
 CONSTRUCTION, date 1945 - 1946
 FIRST BEAM, date (or goal) June 1949
 MAJOR ALTERATIONS External Beam Hall added in 1963
 External Beam Area Relocated in 1983
 COST, ACCELERATOR \$200K
 COST, FACILITY, total \$2 Million
 FUNDED BY

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS ENGINEERS
 TECHNICIANS CRAFTS
 GRAD STUDENTS involved during year
 OPERATED BY X Research staff or Operators
 OPERATION hr/wk, On target hr/wk
 TIME DISTR. in house % Outside %
 BUDGET, op & dev
 FUNDED BY
 RESEARCH STAFF, not included above
 USERS, in house outside
 GRAD STUDENTS involved during year
 RESEARCH BUDGET, in house \$200,000
 FUNDED BY

MAGNET

POLE FACE, diameter (compact) .90 cm, R extraction .90 cm
 R injection 0 cm
 GAP, min 15 cm, Field 16.1 kG }
 max 19 cm, Field 15.1 kG } at 5.3x10⁵
 AVERAGE FIELD at R ext 15.9 kG } Ampere turns
 B max/ 1.01 }
 NUMBER OF SECTORS { compact } Spiral, max deg
 separated }
 SECTOR ANGLE (SSC) deg
 TRIMMING COILS

CONDUCTOR, material and type Aluminum, 6x1 cm
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 150 max, kW; current stability 10⁻³
 trimming coils max, kW; current stability
 WEIGHT: Fe 273 tons; coils
 COOLING system De-ionized water
 ION ENERGY (bending limit) E/A = 100 q²/a² MeV/amu
 (focusing limit) E/A = q²/a² MeV/amu

ACCELERATION SYSTEM

DEES, number 1; angle 180 deg
 BEAM APERTURE 1 cm; DC Bias 0-3 kV
 TUNED by, coarse fine
 RF 30 to 6 MHz, stable ±
 Orb F 26 to 22.3 MHz (protons)
 HARMONICS, RF/Orb F, used
 DEE - Gnd, max 10 kV, min gap 5 cm
 STABILITY, (pk-pk noise)/(pk RF volt)
 ENERGY GAIN, max 20 kV/turn
 RF PHASE, stable to ± 40 (avg.), 200 (pk) deg
 RF POWER input, max kW
 FREQUENCY MODULATION, rate 4000 /s
 modulator, type Swept oscillator
 beam pulse, width 20 μsec

VACUUM SYSTEM

OPERATING PRESSURE 10⁻⁵ Torr or mbar
 PUMPS, No, Type, Size 2x16" Oil Diffusion Pump
 10,000 l/sec each

ION SOURCES

Cold Cathode PIG

INJECTION SYSTEM

Radial Extraction Ion-Source

EXTRACTION SYSTEM

Regeneration Deflection

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 125 m²; movable m²
 TARGET STATIONS in rooms
 STATIONS served at same time, max
 MAG SPECTROGRAPH, type
 COMPUTER model
 OTHER FACILITIES Internal Bombardment Probes

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (pμA)	
	Goal	Achieved	Internal	External
P	100	100	2	0.3
d	50	50	2	0.3
He-3	133	133	1	0.1
He-4	100	100	0.8	0.08

SECONDARY

(part/s)

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH RF deg μA of MeV ions
 PHASE EXC, max RF deg μA of MeV ions
 EXTRACT eff 10-15 % μA of MeV ions
 RESOL ΔE/E % μA of MeV ions
 EMITTANCE
 (π mm. mrad) { 15 axial } μA of MeV ions
 { 20 rad }

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS
 BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS

REFERENCES/NOTES

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

