ENTRY No. FI1-2

NAME OF MACHINE McGill Synchrocyclotron DATE August 10, 1981
INSTITUTION McGill University
ADDRESS 3610 University Street, Montreal, Québec H3A 2B2 CANADA
TEL (514)392-4836 TELEX 05-268510 (from Canada & U.S.A.) 5268510 (elsewhere) Answerback code MCGILLUNIVMTL
IN CHARGE Dr. J.K.P. Lee REPORTED BY Leo Nikkinen

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

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
SCIENTISTS 1 ENGINEERS 1
TECHNICIANS 2 CRAFTS -
GRAD STUDENTS involved during year -
OPERATED BY X Research staff or - Operators
OPERATION 110 hr/wk, On target 75 hr/wk
TIME DISTR. in house 80% %, Outside 20% %
BUDGET, op & dev -
FUNDED BY NSERC

RESEARCH STAFF, not included above
USERS, in house 18 outside 2
GRAD STUDENTS involved during year 11
RESEARCH BUDGET, in house $200,000
FUNDED BY NSERC

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 5.3×10^5 Ampere turns
AVERAGE FIELD at R ext 15.9 kG
B max/ <B> 1.01
NUMBER OF SECTORS compact - separated - Spiral, max - deg
SECTOR ANGLE (SSC) - deg
TRIMMING COILS -

CONDUCTOR, material and type Aluminum 6x0.35 cm
STORED ENERGY (cryogenic) - MJ
POWER : main coils 180 max, kW ; current stability 10^{-5}
trimming coils - max, kW ; current stability -
WEIGHT : Fe 273 tons ; coils 11 tons
COOLING system De-Ionized Water
ION ENERGY (bending limit) E/A = K=100 q^2/a^2 MeV/amu
(focusing limit) E/A = q /a 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 ± 0.1 MHz
Orb F 26 to 22.3(p) mHz
HARMONICS, RF/Orb F, used -
DEE - Gnd, max 10 pk kV, min gap 5 cm
STABILITY, (pk-pk noise)/(pk RF volt) -
ENERGY GAIN, max 4.5 kV/turn
RF PHASE, stable to ± - deg
RF POWER input, max 200 (pk), 40 (avg.) kW
FREQUENCY MODULATION, rate 3,700 Mc/s
modulator, type Swept Oscillator
beam pulse, width 20 μsec

VACUUM SYSTEM
OPERATING PRESSURE 10^{-5} Torr
PUMPS, No, Type, Size 2, Oil Diffusion, 16", 10,000 ℓ/sec each

ION SOURCES
Cold Cathode PIG

INJECTION SYSTEM Axial (p,d) and Radial (^{4}He,^{3}He)
Extration Ion Sources

EXTRACTION SYSTEM
Regenerative Deflection

FACILITIES FOR RESEARCH
SHIELDED AREA, fixed 240 m² ; movable - m²
TARGET STATIONS 5 in 2 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type -
COMPUTER model DEC PDP-15 and PDP-11/34
OTHER FACILITIES Isotope Separator, Superconducting Solenoid Beta Spectrometer, On-Line γ-Spectroscopy Facility, He Jet Internal Bombardment System, Pneumatic Target Transport System.

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p	100	100	2	0.1
d	50	50	2	0.1
^{3}He	133	133	0.2	0.02
^{4}He	100	100	0.4	0.04
SECONDARY			(part/s)	

BEAM PROPERTIES

MEASURED CONDITIONS
PULSE WIDTH 120 RF deg pμA of MeV p ions
PHASE EXC, max RF deg pμA of MeV p ions
EXTRACT eff 10 % pμA of MeV p ions
RESOL ΔE/E 1 % pμA of MeV ions
EMITTANCE
(π mm. mrad) .15 axial .20 rad 0.05 pμA of 100 MeV p ions

OPERATING PROGRAMS, time distribution
BASIC NUCLEAR PHYSICS 80% SOLID STATES PHYSICS -
BIOMEDICAL APPLICAT. - ISOTOPE PRODUCTIONS 20%

REFERENCES/NOTES

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS