ENTRY NO. 60

NAME OF MACHINE Argonne National Laboratory 60-inch Cyclotron DATE 1/17/79
INSTITUTION Chemistry Division, Argonne National Laboratory
ADDRESS 9700 S. Cass Avenue, Argonne, ILL. 60439 U.S.A.

IN CHARGE J. Aron REPORTED by M. C. Oselka

HISTORY AND STATUS

DESIGN, date 1949 MODEL tests 1951-1952
ENG. DESIGN, date 1949-1951
CONSTRUCTION, date 1949-1952
FIRST BEAM date (or goal) 1952
MAJOR ALTERATIONS Magnet Trim Coils added 1964. New Dees - 1974.
OPERATION, ~35 hr/wk; On Target ~30 hr/wk
TIME DIST., in house 95+ %, outside < 5 %
USERS' SCHEDULING CYCLE ~4 weeks
COST, ACCELERATOR $950,000
COST, FACILITY, total $2.2 x 10^6
FUNDED BY AEC, ERDA

ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS 1 ENGINEERS 1
TECHNICIANS 1 CRAFTS
GRAD STUDENTS involved during year
OPERATED BY Res staff or X Operators
BUDGET, op & dev
FUNDED BY US DOE

RESEARCH STAFF, not included above

USERS, in house 6 outside 3
GRAD STUDENTS involved during year 0
RES. BUDGET, in house -
FUNDED BY DOE

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 350 m^2
movable m^2
TARGET STATIONS 11 in 3 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type -
COMPUTER, model -
OTHER FACILITIES Hot Lab, with Caves

REFERENCES/NOTES

W.J.Ramler & G.W.Parker, The Argonne 60-inch Cyclotron ANL-5907.
W.J.Ramler et.al.,Argonne Cyclotron-Helium 3 Conversion ANL-7171.
W.J.Ramler et.al.,Energy-Analyzing System for the Argonne 60-inch Cyclotron ANL-7251.

MAGNET

POLE FACE diameter 152 cm; R extraction 68 cm
GAP, min 30.5 cm; Field kG } at .44 X 10^6 ampere turns
max cm; Field kG }
AVERAGE FIELD at R ext 15 kG
CURRENT STABILITY 16 parts/10^6; $B_{max}/\langle B \rangle$ 1.3
NUMBER OF SECTORS ; SPIRAL, max deg
POLE FACE COIL PAIRS: AVF /sec;
Harmonic correction
Rad grad /sec or Circ coils
WEIGHT: Fe 265 tons; Coils 26 tons
CONDUCTOR, Material and type Aluminum
STORED ENERGY MJ
COOLING SYSTEM Demineralized Water
POWER: Main coils 200 max, kW
Trimming coils max, kW
YOKE/POLE AREA 153 %
SECTOR ANGLE (Sep Sec) deg
ION ENERGY (Bending limit) E/A = q^2/A^2 MeV
(Focusing limit) E/A = q/A MeV

ACCELERATION SYSTEM

DEES, number 2 angle 180 deg
BEAM APERTURE cm; DC BIAS 0 kV
TUNED by, coarse fine Trim Cap
RF 11.2 to 11.5 mHz, stable ± 5 parts /10^6
Orb F 11.2 to 11.5 mHz; GAIN, max 240 kV/turn
HARMONICS, RF/Orb F, used 1
DEE-Gnd, max 120 kV, min gap cm
STABILITY, (pk-pk noise)/(pk RF volt)
RF PHASE stable to ± deg
RF POWER input, max 150 kW
RF PROTECT circuit, speed μsec
Type
FREQUENCY MODULATION, rate 0 /sec
MODULATOR, type
BEAM PULSE, width

VACUUM SYSTEM

PUMPS, No., Type, Size 2 Diffusion Pumps 16 inch
OPERATING PRESSURE 5 μTorr,
PUMPDOWN TIME 6 hrs

ION SOURCES/INJECTION SYSTEM

DC-type hooded arc

EXTRACTION SYSTEM

Electrostatic Deflector

CONTROL SYSTEM

Manual

ENTRY NO. 60 (cont.)

CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	H_2^+		10.7
	D^+		21.4
	$^3He^{++}$		33.0
	α^{++}		43.0
CURRENT		(μA)	(μA)
Internal			
External	D^+		150
	$^3He^{++}$		100
	α^{++}		90
		(part/s)	(part/s)
Secondary			

BEAM PROPERTIES

	Measured	Conditions
Pulse Width	____ RF deg	____ μA of ____ MeV ____
Phase Exc, max	____ RF deg	____ μA of ____ MeV ____
Extract Eff	____ %	____ μA of ____ MeV ____
Res, ΔE/E	____ %	____ μA of ____ MeV ____
Emittance (mm-mrad)	____ axial / ____ radial	____ μA of ____ MeV ____

OPERATING PROGRAMS, time dist

Basic Nuclear Physics	%
Solid State Physics	%
Bio-Medical Applications	10 %
Isotope Production	70 %
Development	10 %
Materials Science	10 %
	%

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, OPERATION SUMMARY, ADDITIONAL REFERENCES