ENTRY NO. 87

NAME OF MACHINE: 60-Inch Cyclotron
INSTITUTION: Brookhaven National Laboratory
ADDRESS: Upton, NY 11973
TEL 516-282-4587, 4397 TELEX 6852516 BNL DOE
IN CHARGE A.P. Wolf, D.J. Schlyer REPORTED BY D.J. Schlyer, A.P. Wolf

A.P. Wolf, Head of Program
D.J. Schlyer, Head of Cyclotron

HISTORY AND STATUS

DESIGN, date 1963 Model tests 1963
ENG DESIGN, date 1964
CONSTRUCTION, date 1965-1967
FIRST BEAM, date (or goal) 1968
MAJOR ALTERATIONS None

COST, ACCELERATOR $400,000 (Conversion)
COST, FACILITY, total $950,000
FUNDED BY USAEC and DOE

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 1 ENGINEERS
TECHNICIANS 3 CRAFTS Laboratory Support
GRAD STUDENTS involved during year 0
OPERATED BY Research staff or X Operators
OPERATION 40 hr/wk. On target 20-30 hr/wk
TIME DISTR. in house 98 %, outside 2 %
BUDGET, op & dev
FUNDED BY DOE and NIH

RESEARCH STAFF, not included above

USERS, in house 6 outside Variable
GRAD STUDENTS involved during year Varies
RESEARCH BUDGET, in house
FUNDED BY DOE and NIH

MAGNET

POLE FACE, diameter (compact) 152 cm, R-extraction 65 cm
R injection 0 cm
GAP, min 19 cm, Field 18 kG
max 34.5 cm, Field 12 kG } at
AVERAGE FIELD at R ext 15.4 kG Ampere turns
B max/<B>
NUMBER OF SECTORS { compact 3 / separated } Spiral, max deg
SECTOR ANGLE (SSC) deg
TRIMMING COILS 8

CONDUCTOR, material and type Hollow copper
STORED ENERGY (cryogenic) MJ
POWER: main coils 200 max kW: current stability
trimming coils max kW: current stability
WEIGHT: Fe 196 tons: coils 10 tons
COOLING system Water
ION ENERGY (Bending limit) E/A = q^2/A^2 MeV/amu
(Focusing limit) E/A = q/A MeV/amu

ACCELERATION SYSTEM

DEES, number 1 angle 180 deg
BEAM APERTURE 3.5 cm; DC Bias 0 kV
TUNED by, coarse M's fine Panels
RF 9 to 21 MHz, stable ±
Orb F 3 to 22 MHz
HARMONICS, RF/Orb F, used 1,3
DEE–Gnd, max 60 kV, min gap 0.7 cm
STABILITY, (pk-pk noise)/(pk RF volt)
ENERGY GAIN, max 120 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 1×10^{-5} Torr or mbar
PUMPS, No, Type, Size 1 - Diffusion Pump 24"

ION SOURCES

Hooded Hot Filament

INJECTION SYSTEM

EXTRACTION SYSTEM

Electrostatic Deflector

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 100 m²; movable 0 m²
TARGET STATIONS 2 in 2 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type
COMPUTER model
OTHER FACILITIES

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
H		10-34	400	40 *
D		17-23	400	40 *
He-3		30-65	200	20 *
He-4		34-46	200	20 *
SECONDARY			(part/s)	

BEAM PROPERTIES

MEASURED		CONDITIONS
PULSE WIDTH	5 RF deg	pμA of MeV ions
PHASE EXC. max	RF deg	pμA of MeV ions
EXTRACT eff.	20 %	pμA of MeV ions
RESOL ΔE/E	%	pμA of MeV ions
EMITTANCE		
(π mm-mrad)	axial	pμA of MeV
	rad	

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS
BIOMEDICAL APPLICAT. 30% ISOTOPE PRODUCTIONS 20%
Chemistry Research 50%

REFERENCES/NOTES

1)
2)

PLAN VIEW OF FACILITY, COMMENTS, ETC.

This machine is used for production of isotopes which cannot be produced by the JSW machine, e.g. ^{211}At ^{131}I, ^{75}Br, etc. It is also used for developmental work in isotope production.

*While the machine is capable of variable energy there are energy gaps in particle production.