ENTRY NO. 82

NAME OF MACHINE: 1.M. RADIAL RIDGE CYCLOTRON
INSTITUTION: University of Birmingham
ADDRESS: P.O. Box 363, Birmingham B15 2TT, U.K.
TEL: 021-472-1301 TELEX:
IN CHARGE: G.C. Morrison REPORTED BY: R.G. Green

HISTORY AND STATUS

DESIGN, date: 1957 Model tests: None
ENG DESIGN, date: 1957-1963
CONSTRUCTION, date: 1958-1963
FIRST BEAM, date (or goal): Int. 1961, Ext. 1963
MAJOR ALTERATIONS:
COST, ACCELERATOR: £ 30K
COST, FACILITY, total:
FUNDED BY: S.E.R.C.

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS: 0 ENGINEERS: 1
TECHNICIANS: 2 CRAFTS: 1
GRAD STUDENTS involved during year: 0
OPERATED BY: 0 Research staff or: 3 Operators
OPERATION: 90 hr/wk. On target: hr/wk
TIME DISTR. in house: 100 %, outside: %
BUDGET, op & dev: £ 5,000
FUNDED BY: S.E.R.C. & Univ. of Birmingham

RESEARCH STAFF, not included above

USERS, in house: outside:
GRAD STUDENTS involved during year:
RESEARCH BUDGET, in house:
FUNDED BY:

MAGNET

POLE FACE, diameter (compact) 102 cm, R-extraction 46 cm
R injection: cm
GAP, min 7 cm, Field 19 kG
max 14.5 cm, Field 13 kG } at
AVERAGE FIELD at R ext 16 kG Ampere turns
B max/<B> 1.2
NUMBER OF SECTORS { compact 3 / separated } Spiral, max: deg
SECTOR ANGLE (SSC): deg
TRIMMING COILS: Harmonic 2
Radial 8
CONDUCTOR, material and type: Cu, strip
STORED ENERGY (cryogenic): MJ
POWER: main coils 40 max kW: current stability
trimming coils: max kW: current stability
WEIGHT: Fe 50 tons: coils 8 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 2-3 cm; DC Bias: kV
TUNED by, coarse M.S. fine M.S.
RF 12 to 16 MHz, stable ± $2/10^6$
Orb F 12 to 16 MHz
HARMONICS, RF/Orb F, used 1
DEE–Gnd, max 27 kV, min gap 0.3 cm
STABILITY, (pk-pk noise)/(pk RF volt) 0.001
ENERGY GAIN, max 54 kV/turn
RF PHASE, stable to ± 3 deg
RF POWER input, max. 45 kW
FREQUENCY MODULATION, rate /s
modulator, type
beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 3×10^{-6} Torr or mbar
PUMPS, No, Type, Size 1 × 40 cm
2 × 22 cm silicon oil

ION SOURCES

Internal Hot cathode
External Pol. D^+, Pol. ^3He

INJECTION SYSTEM

Axial

EXTRACTION SYSTEM

Mag/Elect., Regen., Elect. Defl.

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 90 m^2; movable 0 m^2
TARGET STATIONS 6 in 1 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type None
COMPUTER model GEC 4065
OTHER FACILITIES
10 Mass identification system using counter telescopes. Isotope prod.

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
^4He		25	300	200
^3He		33	150	50
Pol. D^+		12.5		0.2
Pol. ^3He		33		0.005
SECONDARY			(part/s)	

BEAM PROPERTIES

	MEASURED		CONDITIONS			
PULSE WIDTH	30	RF deg	10	pμA of 33	MeV	^2He ions
PHASE EXC. max	15	RF deg	"	pμA of "	MeV	" ions
EXTRACT eff	60	%	"	pμA of "	MeV	" ions
RESOL ΔE/E	0.4	%	"	pμA of "	MeV	" ions
EMITTANCE						
(π mm-mrad)	40	axial	"	pμA of "	MeV	"
	40	rad				

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 20% SOLID STATES PHYSICS
BIOMEDICAL APPLICAT. ISOTOPE PRODUCTIONS 40%
Dev. 40%

REFERENCES/NOTES

1) Nuc. Inst. Meth. 18/19, 25, 1962
2) Nuc. Inst. Meth. 32, 325, 1965

PLAN VIEW OF FACILITY, COMMENTS, ETC.

Main usage of facility now is industrially related, using light element hydrogen profiling techniques and isotope production ^{22}Na, ^{57}Co, ^{7}Be, ^{67}Ga.