

ENTRY No. C58
 NAME OF MACHINE Nuffield 60" Cyclotron DATE
 INSTITUTION Birmingham University, School of Physics and Space Research
 ADDRESS P.O. Box 363, Birmingham B15 2TT
 TEL 021-414-4547 TELEX
 IN CHARGE Prof. T.D. Beynon REPORTED BY E. C. Cartwright

HISTORY AND STATUS
 DESIGN, date 1938 Model tests
 ENG DESIGN, date
 CONSTRUCTION, date
 FIRST BEAM, date (or goal) 1948
 MAJOR ALTERATIONS New Dees and Electromagnetic
 Shimming of Magnet Profile for H⁺, He³
 COST, ACCELERATOR
 COST, FACILITY, total
 FUNDED BY
ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
 SCIENTISTS 1 ENGINEERS --
 TECHNICIANS 3 CRAFTS --
 GRAD STUDENTS involved during year
 OPERATED BY Research staff or 3 Operators
 OPERATION 120 hr/wk, On target 140 hr/wk
 TIME DISTR. in house 20 % , Outside 80 %
 BUDGET, op & dev £ 25 K
 FUNDED BY
 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) 180 cm, R extraction 104 cm
 R Injection 0 cm
 GAP, fixed cm, Field 18 max kG
 25 cm, Field kG at
 AVERAGE FIELD at R ext 13.5 kG Ampere turns
 B max/
 NUMBER OF SECTORS {compact None} Plane Field
 separated Spiral, max deg
 SECTOR ANGLE (SSC) deg
 TRIMMING COILS 5 Radial 4 in Quadrature
 CONDUCTOR, material and type Copper Pyrotenax
 STORED ENERGY (cryogenic) None MJ
 POWER: main coils 4.0 max, kW ; current stability 1 in 10⁵
 trimming coils 1.5 max, kW ; current stability 1 in 10³
 WEIGHT: Fe 250 tons ; coils 40 tons
 COOLING system Air
 ION ENERGY (bending limit) E/A = q²/b² MeV/amu
 (focusing limit) E/A = q²/a² MeV/amu
ACCELERATION SYSTEM
 DEES, number 2 ; angle Symmetrical deg
 BEAM APERTURE at extraction cm ; DC Bias 1 kV
 TUNED by, coarse fixed fine
 RF to 10.5 MHz, stable ± 1 in 10⁴
 Orb F to MHz
 HARMONICS, RF/Orb F, used
 DEE - Gnd, max 90 kV, min gap 7.5 cm
 STABILITY, (pk-pk noise)/(pk RF volt)
 ENERGY GAIN, max kV/turn
 RF PHASE, stable to ± deg
 RF POWER input, max 80 kW
 FREQUENCY MODULATION, rate None /s
 modulator, type --
 beam pulse, width --
VACUUM SYSTEM
 OPERATING PRESSURE 10⁻⁵ Torr or mbar
 PUMPS, No, Type, Size 2 x 37 cm + 22 cm Booster +
 Leybold Rotary + Kinney for roughing
ION SOURCES
 Enclosed Graphite (Oak Ridge Variant)

INJECTION SYSTEM NA
EXTRACTION SYSTEM 70° neg. deflector
FACILITIES FOR RESEARCH
 SHIELDED AREA, fixed m² ; movable m²
 TARGET STATIONS in rooms
 STATIONS served at same time, max
 MAG SPECTROGRAPH, type
 COMPUTER model None
 OTHER FACILITIES Automatic Internal Rotating Target
 Inserting - Extracting
CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (pA)	
	Goal	Achieved	Internal	External
H ⁺			500	100
D ⁺			500	100
He ⁴			250	50
He ³			250	60

SECONDARY (part/s)
BEAM PROPERTIES
 MEASURED N/A CONDITIONS
 PULSE WIDTH RF deg pA of MeV ions
 PHASE EXC, max RF deg pA of MeV ions
 EXTRACT eff % pA of MeV ions
 RESOL ΔE/E % pA of MeV ions
 EMITTANCE
 (r mm, mrad) { axial } pA of MeV ions
 { rad }
OPERATING PROGRAMS, time distribution
 BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS
 BIOMEDICAL APPLICAT. 5% ISOTOPE PRODUCTIONS 95%
REFERENCES/NOTES
PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS