

ENTRY No. 65

NAME OF MACHINE Eindhoven AVF cyclotron DATE
INSTITUTION Eindhoven University of Technology
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IN CHARGE H.L. Hagedoorn REPORTED BY J.I.M. Botman

HISTORY AND STATUS

DESIGN, date 1960 Model tests 1960
ENG DESIGN, date 1961-1962
CONSTRUCTION, date 1962-1963
FIRST BEAM, date (or goal) april 1963
MAJOR ALTERATIONS moved to EUT 1968

COST, ACCELERATOR gift from Philips
COST, FACILITY, total M\$ 3. (1968)
FUNDED BY EUT
ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
SCIENTISTS 1 ENGINEERS 2
TECHNICIANS 3 CRAFTS
GRAD STUDENTS involved during year 1
OPERATED BY 1 Research staff or 1 Operators
OPERATION 70 hr/wk, On target 50 hr/wk
TIME DISTR. in house 100% , Outside %
BUDGET, op & dev k\$ 50
FUNDED BY EUT
RESEARCH STAFF, not included above
USERS, in house 10 outside
GRAD STUDENTS involved during year 20
RESEARCH BUDGET, in house k\$ 85
FUNDED BY EUT

MAGNET
POLE FACE, diameter (compact) 130 cm, R extraction 52 cm
R injection 2 cm
GAP, min 15 cm, Field 20 kG
max 30 cm, Field 10 kG } at 4 x 10^6
AVERAGE FIELD at R ext 15 kG } Ampere turns
B max/ <B> 1.3

NUMBER OF SECTORS { compact 3 } Spiral, max 35 deg
{ separated }
SECTOR ANGLE (SSC) deg
TRIMMING COILS 10 pairs of circular correction coils
3 sets of harmonic coils

CONDUCTOR, material and type Al
STORED ENERGY (cryogenic) MJ
POWER: main coils 130 max, kW; current stability 10^-5
trimming coils 20 max, kW; current stability 10^-5
WEIGHT: Fe 80 tons; coils 10 tons
COOLING system water
ION ENERGY (bending limit) E/A = 30 q^2/a^2 MeV/amu
(focusing limit) E/A = q^2/a^2 MeV/amu

ACCELERATION SYSTEM

DEES, number 1; angle 180 deg
BEAM APERTURE 2 cm; DC Bias 0.7 kV
TUNED by, coarse MS line VC
RF 5 to 23.3 MHz, stable +/- 10^-5
Orb F 5 to 23.3 MHz
HARMONICS, RF/Orb F, used 1,3
DEE - Gnd, max 50 kV, min gap 0.8 cm
STABILITY, (pk-pk noise)/(pk RF volt) 10^-5
ENERGY GAIN, max 100 kV/turn
RF PHASE, stable to +/- 1 deg
RF POWER input, max 100 kW
FREQUENCY MODULATION, rate /s
modulator, type
beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 10 Torr or mbar
PUMPS, No, Type, Size 1 oil diffusion, 8000 l/sec

ION SOURCES

internal Livingston type

INJECTION SYSTEM

EXTRACTION SYSTEM

electrostatic, 80%, 60 kv/4mm, followed by magnetic channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 120 m^2; movable 230 m^2
TARGET STATIONS 6, in 6 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type
COMPUTER model PDP 11/73, VAX
OTHER FACILITIES isotope production
PIXE analysis facility
micro beam

CHARACTERISTIC BEAMS

Table with columns: PARTICLE, ENERGY (MeV) Goal, Achieved, CURRENT (pA) Internal, External. Rows include p, d, He, He and a secondary section.

BEAM PROPERTIES

MEASURED CONDITIONS
PULSE WIDTH 36 RF deg pA of MeV ions
PHASE EXC, max 5 RF deg pA of MeV ions
EXTRACT eff 80% pA of MeV ions
RESOL delta E/E 0.3% pA of MeV ions
EMITTANCE
(axial) 10-20 pA of 20 MeV ions
(rad) 10-20 rad

OPERATING PROGRAMS, time distribution
BASIC NUCLEAR PHYSICS SOLID STATES PHYSICS
BIOMEDICAL APPLICAT. 5 ISOTOPE PRODUCTIONS 60
PIXE 10 microbeam 10 Ruth. back scatt. 15

REFERENCES/NOTES

- 1) Schutte, EUT thesis (1973)
2) Van Heusden, EUT thesis (1976)
3) Botman, EUT thesis (1981)

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS

Minicyclotron ILEC (3 MeVp) under construction
Proposal for mini electron/proton ring EUTERPE

