

ENTRY NO. C38 Date August 1992
 Name of Machine EINDHOVEN AVF CYCLOTRON
 Institution Eindhoven University of Technology
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 In Charge: H.L. HAGEDOORN Reported by: J.I.M. Botman, R. Queens

HISTORY
 MILESTONE DATES:
 Design 1960 Model Tests 1960
 Construction 1962-1963 First Beam April 1963
 DESIGN/CONSTRUCTION BY:
 in house other Philips
 COST: Accelerator gift from Philips Facility M\$3. (1968)
 FUNDED BY: Eindhoven University EUT

STATUS
 STAFF: Machine
 Scientists 1 Engineers 2
 Technicians 3 Students 4
 Research (in house/external)
 Scientists 10 / 5 Engineers /
 Technicians 2 / Students 20 / 5
 BUDGET: Machine k\$ 100 Funded by EUT
 Research k\$ 200 Funded by EUT
 TIME DISTRIBUTION:
 Basic Research (in house/external) 40 % / %
 Applied Program (in house/external) % / 45 %
 Development 5 % Maintenance 10 %

MAGNET
 POLE PARAMETERS:
 Diameter 130 cm $R_{extract}$ 52 cm R_{inject} 2 cm
 HILL PARAMETERS: Gap (min) 15 cm B_{max} 2 T
 (@ 4.10 AT) Gap (max) cm B_{min} T
 VALLEY PARAMETERS: Gap (min) 30 cm B_{max} 1.2 T
 (@ 4.106 AT) Gap (max) cm B_{min} T
 AVERAGE FIELD: $\langle B \rangle_{min}$ T $\langle B \rangle_{max}$ 1.55 T
 NUMBER OF SECTORS: compact/separated 3 /
 sector angle 70 deg. spiral (max) 35 deg.
 FIELD TRIMMING: Trim Coils 10
 Harmonic Coils 3
 Other
 CURRENT: Main Coils 300 Amps Stability 10^{-5}
 Trim Coils 200 Amps Stability 10^{-4}
 Stored Energy (cryogenic) MJ
 WEIGHT: Iron 80 ton Conductor 10 ton
 ION ENERGY: Bending Limit $E/A = 30 q^2/A^2$ MeV/u
 Focussing Limit $E/A = q/A$ MeV/u

ACCELERATION SYSTEM
 FUNDAMENTAL ACCELERATION:
 Description: $\lambda/4$ resonator
 No. of Gaps/turn 2 $dE/dn(max)$ 0.1 MeV/q
 Voltage(max) 0.05 MV Harmonic f_{rf}/f_{ion} 1.05, 3
 Freq 5.23, 3 MHz Power in(max) 0.1 MW
 Stability: Phase 1 deg. Voltage 10^{-5}
 OTHER CAVITIES (Flattopping or otherwise):
 Description:
 Region of Influence: R_{min} cm R_{max} cm
 No. of Gaps/turn $dE/dn(max)$ MeV/q
 Voltage(max) MV Harmonic f_{rf}/f_{ion}
 Freq MHz Power in(max) MW
 Stability: Phase Voltage

VACUUM SYSTEM
 OPERATING PRESSURE: 10^{-6} Torr
 PUMPS: No. and type 1 oil diffusion 8000 l/s

ION SOURCE(S)
 Type Intensity ϕ $\epsilon_n = \beta\gamma\epsilon$ Ion Species
 (mA) (π mm mrad)
 (a) internal Livingston type
 (b)
 (c)
 (d)

INJECTION SYSTEM
 Efficiency %

EXTRACTION SYSTEM
 electrostatic, 80°, 60 kV/4mm Efficiency 70 %
 followed by magnetic channel

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current(part μ A)	
		Internal	External
(a) D	2.5 - 29.5	500	100
(b) 3He	3 - 15	500	100
(c) 4He	6 - 30	50	30
(d)			

Secondary Particles	E (MeV)	part/sec
(a)		
(b)		
(c)		

EXTRACTED BEAM PROPERTIES:
 For 100 μ A of 25 MeV/u 10 ions
 $\Delta E/E$ 0.3 % $\Delta\phi$ 40 °rf
 $\epsilon_n = \beta\gamma\epsilon$ x 6 π mm mrad z 4 π mm mrad

FACILITIES FOR RESEARCH
 SHIELDED AREA: Fixed 120 m² Moveable 230 m²
 Target Stations: 9 No. Served At Same Time: 1
 MAGNETIC SPECTROMETERS:
 OTHER FACILITIES: isotope production
 PIXE facility
 microbeam
 channeling facility

REFERENCES/NOTES
 (a) EUT thesis Schutte (1973), Van Heusen (1976)
 (b) Botman (1981)

