

ENTRY NO. C40 Date September 1995
 Name of Machine EINDHOVEN AVE. CYCLOTRON
 Institution Eindhoven University of Technology (TUE)
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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 Philips Facility M\$3 (1968)
 FUNDED BY: Eindhoven University EUT

STATUS

STAFF: Machine

Scientists 1 Engineers 2
 Technicians 4.3 Students 4
 Research (in house/external)

Scientists 10 / 5 Engineers /
 Technicians 2 / Students 20 / 5

BUDGET: Machine k\$ 100 Funded by TUE
 Research k\$ 200 Funded by TUE

TIME DISTRIBUTION:

Basic Research (in house/external) 40 % / %
 Applied Program (in house/external) % / 45 %
 Maintenance 10 % Development 5 %

MAGNET

POLE PARAMETERS:

Diameter 130 cm R_{extract} 52 cm R_{inject} 2 cm

HILL PARAMETERS: Gap (min) 15 cm B_{max} 2 T
 (@ $4 \cdot 10^6$ AT) Gap (max) cm B_{min} T

VALLEY PARAMETERS: Gap (min) 30 cm B_{max} 1.2 T
 (@ $4 \cdot 10^6$ AT) Gap (max) cm B_{min} T

AVERAGE FIELD: $\langle B \rangle_{\text{min}}$ T $\langle B \rangle_{\text{max}}$ 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 $E/A = 30 \text{ q}^2/\text{A}^2 \text{ MeV/u}$
 Focusing Limit $E/A = \text{q/A MeV/u}$

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:

Description: $\lambda/4$ resonator
 No. of Gaps/turn 2 $dE/dn(\text{max})$ 0.1 MeV/q
 Voltage (max) 0.05 MV Harmonic $f_{\text{rf}}/f_{\text{ion}}$ 1.0/3
 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 $dE/dn(\text{max})$ MeV/q
 Voltage (max) MV Harmonic $f_{\text{rf}}/f_{\text{ion}}$
 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 (mA)	@ $\epsilon_n = \beta_{\text{ye}}$ (π mm mrad)	Ion Species
(a) internal Livingstone type			
(b)			
(c)			
(d)			

INJECTION SYSTEM

Efficiency %

EXTRACTION SYSTEM

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

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μ A)	
		Internal	External
(a) P^{+}	2.5 - 29.5	500	100
(b) d^{+}	3 - 15	500	100
(c) $^4\text{He}^{+}$	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 p ions
 $\Delta E/E$ 0.3 % $\Delta \phi$ 40 °rf
 $\epsilon_n = \beta_{\text{ye}} \times 6 \pi$ 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) TUE thesis Schutte (1973), van Heusden (1976)
 (b) Botman (1981)

PLAN VIEW OF FACILITY, COMMENTS

