

ENTRY NO. C52 Date 27, 1992
 Name of Machine Gustaf Werner Cyclotron
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 In Charge: S. Holm Reported by: S. Holm

HISTORY

MILESTONE DATES:
 Design 1946-1977- Model Tests 1974 - 1978
 Construction 1946-51, 1979-86 First Beam 1951, 1986, 1987ext
 DESIGN/CONSTRUCTION BY:
 in house 4 other
 COST: Accelerator Reconst. 25MSEK. Facility 70.MSEK.total.
 FUNDED BY: Swedish state

STATUS

STAFF: Machine
 Scientists 3 Engineers 5
 Technicians 7 Students
 Research (in house/external)
 Scientists 20 / 100 Engineers /
 Technicians / Students /
 BUDGET: Machine 1.MSEK. Funded by Swedish state
 Research 10.MSEK. Funded by Swedish state
 TIME DISTRIBUTION:
 Basic Research (in house/external) 60 % / %
 Applied Program (in house/external) 20 % / %
 Development 10 % Maintenance 10 %

MAGNET

POLE PARAMETERS:
 Diameter 280 cm R_{extract} 120 cm R_{inject}
 HILL PARAMETERS: Gap (min) 20 cm B_{max} 2.0 T
 (0.6 MAT) Gap (max) cm B_{min} 0.8 T
 VALLEY PARAMETERS: Gap (min) 36 cm B_{max} 1.3 T
 (0.6 MAT) Gap (max) cm B_{min} 0.5 T
 AVERAGE FIELD: < B >_{min} 0.4 T < B >_{max} 1.75 T
 NUMBER OF SECTORS: compact/separated 3 /
 sector angle deg. spiral (max) deg.
 FIELD TRIMMING: Trim Coils 13 pair circular
 Harmonic Coils 2 sets
 Other
 CURRENT: Main Coils 1000 Amps Stability 10 ppm
 Trim Coils 100 Amps Stability 100 ppm
 Stored Energy (cryogenic) MJ
 WEIGHT: Iron 600 tons Conductor 50 tons
 ION ENERGY: Bending Limit E/A = 200 q²/A² MeV/u
 Focussing Limit E/A = 105 q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:
 Description: lambda-quarter cavity
 No. of Gaps/turn 4 dE/dn(max) 0.20 MeV/q
 Voltage(max) 0.050 MV Harmonic f_{rf}/f_{ion} 1, 2, 3
 Freq 12-24 MHz Power in(max) 0.200 MW
 Stability: Phase +0.5 deg. Voltage +0.1 %
 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: 5.10⁻⁷ mbar
 PUMPS: No. and type 2 oil diff. pumps, each 9000 l/sec
 baffled, Intermediate vacuum: < 10⁻⁴ mbar, 700 l/sec

ION SOURCE(S)

Type	Intensity (mA)	ϕ (πmm mrad)	ε _n = βγϵ	Ion Species
(a) PIG	0.1			p+, 4He++
(b) ECR	0.050			Heavy ions
(c) Polarized	0.050			p+, d+
(d)				

INJECTION SYSTEM

Spiral infl. extern injection Efficiency < 5% %

EXTRACTION SYSTEM

professional, regenerative Efficiency 60-80 %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μA)	Internal	External
(a) p+	10-100	100		
(b) p+	100-190			100nA
(c) Heavy ions	5-50	0.1-100		0.05-0.5
(d)				
Secondary Particles	E (MeV)			
(a) neutrons	< 190	10 ⁶		part/sec -4 sr
(b)				
(c)				

EXTRACTED BEAM PROPERTIES:

For 0.1 μA of 50 MeV/u p+ ions
 ΔE/E 0.2 % Δφ 20 °rf
 ε_n = βγϵ x 9 πmm mrad z 9 πmm mrad

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed 600 m² Moveable m²
 Target Stations: 7 No. Served At Same Time:
 MAGNETIC SPECTROMETERS: HESM, PACMAN, LISA
 OTHER FACILITIES: Treatment bench for eye melanoma
 Cave for production of isotopes
 Special target system for neutron production

REFERENCES/NOTES

- (a) S. Holm et al, Physica Scripta, Vol 34, 513-532, 1986
- (b) C. Ekström et al, Physica Scripta, Vol T22, 256-268

PLAN VIEW OF FACILITY, COMMENTS

