

ENTRY NO. C54 Date 5. October, 1995
 Name of Machine Gustav Werner Cyclotron
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 In Charge: DAG REISTAD Reported by: DAG REISTAD

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 Facility

FUNDED BY:

STATUS

STAFF: Machine

Scientists 2 Engineers 5

Technicians 15 Students

Research (in house/external)

Scientists / Engineers /

Technicians / Students /

BUDGET: Machine Funded by

Research Funded by

TIME DISTRIBUTION:

Basic Research (in house/external) % / %

Applied Program (in house/external) % / %

Maintenance % Development %

MAGNET

POLE PARAMETERS:

Diameter 280 cm R_{extract} 120 cm R_{inject} cm

HILL PARAMETERS: Gap (min) 20 cm B_{max} 2.0 T

(@ 0.6 M AT) Gap (max) cm B_{min} 0.8 T

VALLEY PARAMETERS: Gap (min) 36 cm B_{max} 1.3 T

(@ 0.6 M AT) Gap (max) cm B_{min} 0.5 T

AVERAGE FIELD: $\langle B \rangle_{\text{min}}$ 0.4 T $\langle B \rangle_{\text{max}}$ 1.75 T

NUMBER OF SECTORS: compact/separated 3 /

sector angle deg. spiral (max) deg.

FIELD TRIMMING: Trim Coils 13

Harmonic Coils 3 inner + 3 outer

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 $E/A = 192 \text{ q}^2/A^2 \text{ MeV/u}$

Focusing Limit $E/A = 100 \text{ q/A MeV/u}$

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:

Description: $\lambda/4$ cavity

No. of Gaps/turn 4 $dE/dn(\text{max})$ 0.20 MeV/q

Voltage (max) 0.050 MV Harmonic f_n/f_{ion} 1, 2, 3, 4

Freq 12 - 24 MHz Power in(max) 0.2 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 $dE/dn(\text{max})$ MeV/q

Voltage (max) MV Harmonic f_n/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 with cryogenic

baffles, 2 cryogenic Meissner traps

ION SOURCE(S)

Type	Intensity (mA)	@ $\epsilon_n = \beta\gamma\epsilon$ ($\pi \text{ mm mrad}$)	Ion Species
(a) PIG	0.1		p, d, α
(b) ECR	0.050		heavy ions
(c) polarized	0.050		p, d
(d)			

INJECTION SYSTEM

spiral inflector Efficiency 10 %

EXTRACTION SYSTEM

precessional, regenerative Efficiency 60-80 %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μA)
		Internal External
(a) p	≤ 100	≤ 10
(b) p	≤ 180	≤ 0.1
(c) heavy ions	5 - 50	≤ 10
(d)		

Secondary Particles	E (MeV)	part/sec 10^6 in 10^{-4} sr
(a) neutrons	< 180	
(b)		
(c)		

EXTRACTED BEAM PROPERTIES:

For 0.1 μA of 50 MeV/u p ions

$\Delta E/E$ 0.2 % $\Delta\phi$ 20 °rf

$\epsilon_n = \beta\gamma\epsilon$ x $\pi \text{ mm mrad}$ z $\pi \text{ mm mrad}$

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed: 600 m² Moveable m²

Target Stations: 7 No. Served At Same Time:

MAGNETIC SPECTROMETERS: BESM, PACMAN, LISA

OTHER FACILITIES: Radionuclide production facility

Radiotherapy of head and neck

REFERENCES/NOTES

(a) D. Reistad, proc. 1993 P.A.C.S. 1744,

(b) B. Lundström, these proceedings.

PLAN VIEW OF FACILITY, COMMENTS

