ENTRY NO. C1 **Date** June 1992

Name of Machine CYCLONE

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In Charge: G. RYCKEWAERT **Reported by:** M. LOISELET

HISTORY

MILESTONE DATES:
Design 1969 Model Tests 1969
Construction 1969-1971 First Beam 1972
DESIGN/CONSTRUCTION BY:
in house ... other 6 CGR-MEV ... 6
COST: Accelerator 3 x 10 US $ Facility 6.5 x 10 US $
FUNDED BY: Univ. de Louvain, IISN (State)

STATUS

STAFF: Machine
Scientists 4 Engineers 4
Technicians 11 Students ...
Research (in house/external)
Scientists ... / ... Engineers ... / ...
Technicians ... / ... Students ... / ...
BUDGET: Machine ... Funded by ...
Research ... Funded by ...
TIME DISTRIBUTION:
Basic Research (~~in house/external~~) 53 % / ... %
Applied Program (~~in house/external~~) 24 % / ... %
Development 10 % Maintenance 13 %

MAGNET

POLE PARAMETERS:
Diameter 215.6. cm $R_{extract}$ 93 cm R_{inject} ... cm
HILL PARAMETERS: Gap (min) 16.5 cm B_{max} 2.15 T
(@ 4 x 10^5 AT) Gap (max) - cm B_{min} - T
VALLEY PARAMETERS: Gap (min) 40.5 cm B_{max} 1.15 T
(@ 4 x 10^5 AT) Gap (max) - cm B_{min} - T
AVERAGE FIELD: $< B >_{min}$ 0.6 T $< B >_{max}$ 1.6 T
NUMBER OF SECTORS: compact/separated 4 / ...
sector angle variable deg. spiral (max) 53 deg.
FIELD TRIMMING: Trim Coils 12 pairs
Harmonic Coils 2 x 4 pairs
Other -
CURRENT: Main Coils 1100 Amps Stability 10^{-5}
Trim Coils 300-500-700 Amps Stability 10^{-3}
Stored Energy (cryogenic) ... MJ
WEIGHT: Iron 200 tons Conductor 6 tons
ION ENERGY: Bending Limit E/A = 115 q^2/A^2 MeV/u
Focussing Limit E/A = 95 q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:
Description: moving panels ; 2 dees 86 deg
No. of Gaps/turn 4 dE/dn(max) 0.200 MeV/q
Voltage(max) 0.050 MV Harmonic f_{rf}/f_{ion} 1,2,3,6
Freq 108-23 MHz Power in(max) 0.200 MW
Stability: Phase 0.1 deg. Voltage 10^{-4}
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: $2 \cdot 10^{-6}$
PUMPS: No. and type 2 oil diffusion 12.000 l/s
2 cryopumps 3.600 l/s

ION SOURCE(S)

	Type	Intensity (mA)	@	$\epsilon_n = \beta\gamma\epsilon$ (πmm mrad)	Ion Species
(a)	Livingston				p, d, α
(b)	ECR 2 stages				heavy ions
(c)	ECR 1 stage				radioactive ions
(d)					

INJECTION SYSTEM

axial injection ... Efficiency (max) 16 %

EXTRACTION SYSTEM

dc electrostatic + magn. chan. ... Efficiency (max) 80 %

CHARACTERISTIC BEAMS

	Accelerated Ions	E/A (MeV/u)	Current(part μA) Internal	External
(a)	p	85/65	...	5/25
(b)	α	115	...	15
(c)	heavy ions	115 Q^2/A	...	...
(d)	radioactive ions (^{13}N, ^{19}Ne)		...	100 ppA

	Secondary Particles	E (MeV)	part/sec
(a)	n from p + Be at 65 MeV	...	10^{11}
(b)		...	...
(c)		...	...

EXTRACTED BEAM PROPERTIES:
For 15 μA of 65 MeV/u H ions
$\Delta E/E$ 0.3 % $\Delta\phi$ ... °rf
$\epsilon_n = \beta\gamma\epsilon$ x 23 πmm mrad z 15 πmm mrad

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed 490 m² Moveable 1300 m²
Target Stations: 11 No. Served At Same Time: 1
MAGNETIC SPECTROMETERS: ...
OTHER FACILITIES: hot cells - neutrontherapy (multileaves collimator) - protontherapy - on line mass separator (LISOL) - radioactive beams

REFERENCES/NOTES

(a) ...
(b) ...

PLAN VIEW OF FACILITY, COMMENTS