Entry: C1
Date: June 1998
Machine Name: CYCLONE
Institution: Université catholique de Louvain
Address: (UCL) 2, chemin du Cyclotron B-1348 Louvain-la-Neuve (Belgium)
In Charge of the cyclotron: G. RYCKEWAERT
Tel: +32-10-47 32 37
Web: http://www.cyc.ucl.ac.be/CYC/
Fax: +32-10-45 21 83
E-mail: Ryckewaert@cyc.ucl.ac.be

HISTORY
Design by: THOMSON - CSF (CGR-MeV)
Construction time: 1969 - 1972
First beam: 1972

CHARACTERISTIC BEAMS
ions / energy (MeV/n) / current (pps) / power (W) :
- P. ; 20 - 80 ; 10^{14} ; 1.5
- d, α ; 2.3 - 27 ; 1.5
- Heavy ions ; 0.6 - 27 ; 10^{13}
- Radioactive ions ; 0.6 - 5 ; 10^{5} - 10^{9}

transmission efficiency (total)
- typical: 60 % - best: 80 %

transverse emittance (rms)
- vertical: 15 π mmmrad
- horizontal: 23 π mmmrad

longitudinal emittance (rms) 3 x 10^{-3} x 6 ΔE/E.deg RF

USES
basic research: 50. % therapy: 20 %
development: 5. % isotope production: -. %
other applications: 10. % maintenance: 10 %
beam tuning: 5. %
total time: 5,500. h/year

TECHNICAL DATA
a) magnet
type: compact H-type ; r.t. coils
Kb: 110. MeV/A Kf: 80. MeV/A
average field (min-max): 0.6 - 1.6 T
number of magnet sectors: 4
- angle: variable deg
- spiral (max): 53 deg

pole parameters
- diameter: 2.156 m
- injection radius: - m
- extraction radius: 0.923 m

hill gap: 0.165 m valley gap: 0.405 m

field trimming
- trim coils
  - number: 12
  - current (max): 700 A
- harmonic coils
  - number: 2 x 4 pairs
  - current (max): 15 A
- others
  - number: -
  - current (max): - A

main coils: 1 pair
- number:
- Ampere-turns: 400.000 A.T.
- current: 1.100 A

stored energy: - MJ
weight : - iron: 200. t - coils: 6 t
power
- main coils (total): 300 kW
- trim coils (total max): 100 kW
- refrigerator (cryogenic): - kW

b) RF
- acceleration
- frequency range: 10.6 - 23 MHz
- harmonic modes: 1,2,3,6
- number of dees: 2
- angular aperture: 86 deg
- voltage:- average (min-max): 20 - 50 kV
  - variation with radius:
  -
- power in (max): 50 kW
- stability: - phase: 0.1 deg - voltage: 0.01 %

- other cavities
  - purpose:
  - frequency range: MHz
  - region of influence: m
  - voltage (max): kV
  - power in (max): kW
  - stability:- phase: deg - voltage: %

c) injection
- internal source: FILAMENT
- external (~~axial~~): ECR
  - elements:
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  - source voltage: 6 - 15 kV
  - injection energy: variable MeV/n
  - buncher: double gap - sinusoidal
- injection efficiency: 5 - 20 %

d) ion sources/injector
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e) extraction
- elements, characteristics:
  - electrostatic deflector
  - active magnetic channel
  - passive focusing channel
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- efficiency
  - typical: 60 % - best: 85 %

f) vacuum
- pumps: 2 x 10.000 l/s oil diffusion
  2 x 3.500 l/s cryopumps
- achieved vacuum: 10^{-7} Pa

REFERENCES
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EXPERIMENTAL FACILITIES
Mono-energetic neutron source,
DEMON - LEDA - LISOL
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PLAN VIEW OF FACILITY