

**ENTRY NO:** C-1  
**Machine Name:** CYCLONE  
**Date:** 6/5/01 11:39:35 AM  
**Institution:** Universite catholique de Louvain  
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## HISTORY

**Designed By:** THOMSON - CSF  
**Construction Dates:** 1969 - 1972  
**First Beam Date:** 1972

## CHARACTERISTIC BEAMS

ions	/ energy(MeV/N)	/current(pps)	/power(w)
Protons	20 - 80	2. 10exp14	1500
Deuterons	2.3 - 27	2. 10exp14	1500
Heavy Ions	0.6 - 27	1. 10exp13	
Radioactive Ions	0.6 - 5	1. 10exp9	

## transmission efficiency(source to extract beam)

**typical:** 5% - **best:** 16%

## tranverse emittance

### emittance definition: RMS

**vertical:**  $15\pi$  mm mrad

**horizontal:**  $23\pi$  mm mrad

**longitudinal:**  $0.3\% * 6 \text{ deg}(\Delta) E/E\% \times \text{deg RF}$

## USES

<b>basic research:</b> 55%	<b>therapy:</b> %
<b>development:</b> 3%	<b>isotope production:</b> %
<b>other:</b> 30%	<b>maintenance:</b> 12%
<b>beam tuning:</b> %	<b>Total Time:</b> 4600h/year

## TECHNICAL DATA

a)magnet: type: Compact  
Kb: 110MeV/A Kf: 80MeV/A  
average field (min/max): 1.6 - 0.6 T  
number of magnet sectors: 4  
hill angular width: hill angular width  
spiral (max): 53 deg  
pole parameters  
diameter: 2.156 m  
injection radius: m  
extraction radius: 0.923 m  
hill gap: 0.165m valley gap: 0.405m  
trim coils  
-number: 12x2  
-current(max): 700 A-turns  
harmonic coils  
-number: 2xNsectorsx2  
-current(max): 15 A-turns  
main coils  
number: 1x2  
total ampere-turns: 400 000 A-turns  
current: 1 100 A  
stored energy: MJ  
weight - iron: 200t coils: 6t  
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  
number of cavities: 2  
dee angular width: 86degrees  
voltage  
at injection: 35kV(peak to ground, max)  
at extraction: 35kV(peak to ground, max)  
peak: 50kV(peak to ground, max)  
line power(max): 50kW  
stability  
phase: 0.1 deg  
voltage: 0.01%  
injection  
c)ion source: Filament / ECR  
external injection: AXIAL  
components:  
source bias voltage: 6 - 15kV  
injection energy: variableMeV/N  
buncher: double gap - sinusoidal  
injection efficiency: 5 - 20%  
d)injector:  
e)extraction  
electrostatic deflector active magnetic channel passive focusing  
channel  
efficiency  
typical: 60%  
best: 85%  
f)vacuum  
pumps: oil diffusion + cryopumps  
achieved vacuum: Pa  
**REFERENCES**

## EXPERIMENTAL FACILITIES

mono-energetic neutron line LEDA (solid state detection array)  
LISOL (Leuven Isotope Separator On Line) DEMON HIF  
(Heavy Ion Irradiation Facility)

## COMMENTS