

Entry: **C21**  
 Machine Name: MEDICYC  
 Address: Cyclotron Laboratory, 227 Avenue de la Lanterne: 06200 Nice (FRANCE)  
 In Charge of the cyclotron: P. Mandrillon  
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Date: June 1998  
 Institution: Centre Antoine Lacassagne  
 Web:  
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**HISTORY**

Design by: in house  
 Construction time: 1984/1989  
 First beam: Dec 1990

**CHARACTERISTIC BEAMS**

ions / energy (MeV/n) / current (pps) / power (W) :  
 - H minus / 65 MeV /  $10^{14}$  / 3500

transmission efficiency (total)  
 - typical: 99 % - best: 99 %  
 transverse emittance (rms)  
 - vertical:  $\pi$  mmmrad  
 - horizontal:  $\pi$  mmmrad  
 longitudinal emittance (rms)  $\Delta E/E$ .deg RF

**USES**

basic research: % therapy: 85 %  
 development: 5 % isotope production: %  
 other applications: 5 % maintenance: 5 %  
 beam tuning: %  
 total time: h/year

**TECHNICAL DATA**

a) magnet  
 type:  
 Kb: MeV/A Kf: 70 MeV/A  
 average field (min-max): T  
 number of magnet sectors: 4  
 - angle: 42.5 deg  
 - spiral (max): 60 deg  
 pole parameters  
 - diameter: 1.60 m  
 - injection radius: 0.025 m  
 - extraction radius: 0.68 m  
 hill gap: 0.13 m valley gap: 0.27 m  
 field trimming  
 - trim coils  
 - number: 10  
 - current (max): 100 A  
 - harmonic coils  
 - number: 4  
 - current (max): 100 A  
 - others  
 - number:  
 - current (max): A  
 main coils:  
 - number: 2  
 - Ampere-turns: A.T.  
 - current: 1200 A  
 stored energy: MJ  
 weight : - iron: 130 t - coils: t  
 power  
 - main coils (total): kW  
 - trim coils (total max): kW  
 - refrigerator (cryogenic): kW

b) RF

- acceleration  
 - frequency range: Fixed 25.0 MHz  
 - harmonic modes: 1, 2, 3  
 - number of dees: 2  
 - angular aperture: 75 deg  
 - voltage:- average (min-max): 52 kV  
 - variation with radius:  
 - power in (max): 50 kW  
 - stability: - phase: <0.5 deg - voltage: 0.1 %

- 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:  
 - external (radial/axial): axial  
 - elements: spiral inflector  
 - source voltage: 33 kV  
 - injection energy: 0.033 MeV/n  
 - buncher: 2 bunchers: 1st at 25 Mhz, 2nd at 50 Mhz  
 - injection efficiency: %

d) ion sources/injector

Multi-cusp

e) extraction

- elements, characteristics:  
 - Stripping foil  
 - efficiency  
 - typical: 99 % - best: 99 %

f) vacuum

- pumps: 2 Turbo and 2 Cryo  
 - achieved vacuum:  $10^{-7}$  Torr Pa

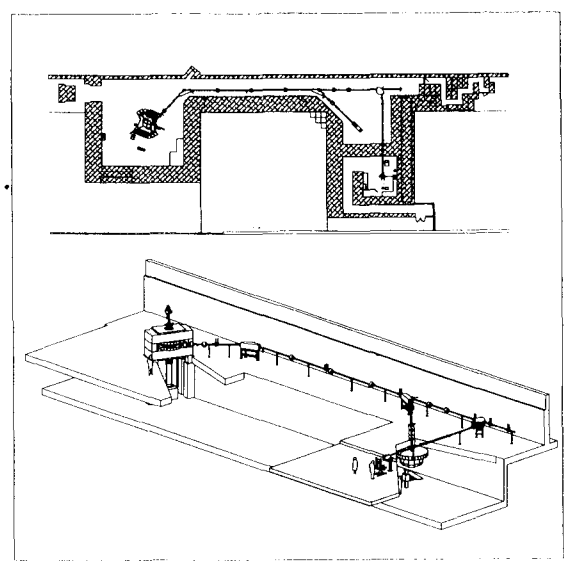
**REFERENCES**

Proc. 12 th Int.Conference on Cyclotrons

**EXPERIMENTAL FACILITIES**

3 beam lines: 1) low energy protontherapy 2) high energy neutrontherapy 3) industrial irradiations line

**PLAN VIEW OF FACILITY**



**COMMENTS**