

**ENTRY NO:** CU-3  
**Machine Name:** CV-28 Cyclotron  
**Date:** 6/1/01 5:31:01 AM  
**Institution:** Instituto de Pesquisas Energeticas e Nucleares  
**Address** Travessa "R", 400 - Cidade Universitaria  
**In Charge of Cyclotron:** Wanderley de Lima  
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**HISTORY**

**Designed By:** The Cyclotron Corporation - TTC  
**Construction Dates:** 1977  
**First Beam Date:** Dec. 1983

**CHARACTERISTIC BEAMS**

ions	/ energy(MeV/N)	/current(pps)	/power(w)
p	2-24	3.75E14	1440
d	4-14	6.24E14	1400
3He++	6-36	3.12E14	1800
4He++	8-28	2.50E14	1120

**transmission efficiency(source to extract beam)**

**typical:** 40% - **best:** 60%

**transverse emittance**

**emittance definition:**

**vertical:**  $9.6\pi$  mm mrad

**horizontal:**  $9.6\pi$  mm mrad

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

**USES**

**basic research:** 100%      **therapy:** %  
**development:** %      **isotope production:** %  
**other:** %      **maintenance:** %  
**beam tuning:** %      **Total Time:** 100h/year

**TECHNICAL DATA**

**a)magnet:**      **type:** Compact  
**Kb:** MeV/A      **Kf:** MeV/A  
**average field (min/max):** 1.74 T  
**number of magnet sectors:** 3  
**hill angular width:** hill angular width  
**spiral (max):** 60 deg  
**pole parameters**  
**diameter:** 0.96 m  
**injection radius:** m  
**extraction radius:** 0.42 m  
**hill gap:** 0.0508m      **valley gap:** 0.1164m  
**trim coils**  
**-number:** 4x2  
**-current(max):** A-turns  
**harmonic coils**  
**-number:** 3xNsectorsx2  
**-current(max):** A-turns  
**main coils**  
**number:** 2x2  
**total ampere-turns:** 2.3E5 A-turns  
**current:** 230 A  
**stored energy:** MJ  
**weight - iron:** t      **coils:** t  
**power**  
**main coils (total):** 69 kW  
**trim coils (total max):** 50 kW  
**refrigerator (cryogenic):** kW  
**b)RF**  
**acceleration**  
**frequency range:** 6.5-25.5MHz

**harmonic modes:** First  
**number of dees:** 2  
**number of cavities:**  
**dee angular width:** 90degrees  
**voltage**  
**at injection:** kV(peak to ground, max)  
**at extraction:** kV(peak to ground, max)  
**peak:** kV(peak to ground, max)  
**line power(max):** kW  
**stability**  
**phase:** deg  
**voltage:** 1%  
**injection**  
**c)ion source:** Cold Cathode - Penning or Thermionic  
**external injection:** Radial  
**components:** Cathode  
**source bias voltage:** 2.5kV  
**injection energy:** MeV/N  
**buncher:**  
**injection efficiency:** %  
**d)injector:**  
**e)extraction**  
Electrostatic Deflector - Magnetic Channel  
**efficiency**  
**typical:** 40%  
**best:** 60%  
**f)vacuum**  
**pumps:** Diffusion Pump  
**achieved vacuum:** 1.3E-3Pa  
**REFERENCES**  
The Cyclotron Corporation, Instruction and Services Manual for The Cyclotron Corporation's - Model CV-28 Cyclotron - Ser. 604, US PAT. (TCC INS 26), Nov.12, 1976.  
**EXPERIMENTAL FACILITIES**

**COMMENTS**

