

ENTRY NO. 5

NAME OF MACHINE Ciclotron de Energia Variável
 INSTITUTION Instituto de Engenharia Nuclear
 LOCATION C. Universitária - I. do Fundão DATE 5.5.75
BRASIL
 IN CHARGE _____ REPORTED by Arthur Gerbasi da Silva

HISTORY AND STATUS

DESIGN, date _____ MODEL tests _____
 ENG. DESIGN, date Cyclotron Corp. CV-28
 CONSTRUCTION, date '71 - '74
 FIRST BEAM date (or goal) Dec. '74
 MAJOR ALTERATIONS None
 OPERATION, _____ hr/wk; On Target _____ hr/wk
 TIME DIST., in house _____ %, outside _____ %
 USERS' SCHEDULING CYCLE _____ weeks
 COST, ACCELERATOR US\$ 500,000
 COST, FACILITY, total US\$ 1 200,000
 FUNDED BY CNEN - Brazil

ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS 1 ENGINEERS 2
 TECHNICIANS 3 CRAFTS _____
 ADMIN & CLER 1 TOTAL 7
 GRAD. STUDENTS involved during year _____
 OPERATED BY Res staff or Sp operators
 BUDGET, op & dev _____
 FUNDED BY CNEN - Brazil

RESEARCH STAFF, not included above

USER GROUPS, in house 2 outside _____
 STAFF SCIENTISTS, in house 6 outside _____
 TOTAL RES STAFF, in house 4 outside _____
 GRAD STUDENTS involved during year 2
 RES. BUDGET, in house _____
 FUNDED BY CNEN - Brazil

FACILITIES FOR RESEARCH PROGRAMS

SHIELDED AREA, fixed 50 m²
 movable 25 m²
 TARGET STATIONS 1 in 1 ROOMS
 STATIONS SERVED AT THE SAME TIME, max 1
 MAG SPECTROGRAPH, type ---
 ON-LINE COMPUTER, model ---
 FACILITIES for:
 Isotope production in preparation
 Irradiation, Solid State ---
 Biological ---
 Time-of-Flight Study ---
 On-Line Mass Separation ---

NOTATIONS

MAGNET

POLE FACE dia 96 cm; R ext 42 cm
 GAP, min 5.6 cm; Field 21 kG }
 max _____ cm; Field 14.5 kG } at _____ x 10⁶
 AVE FIELD at R max 18.5 kG } A-turns
 CURRENT, STABILITY ± 10 parts/10⁶
 B max/ = _____
 AVF SECTORS 3 SPIRAL, max 50 deg
 POLE FACE coil pairs, AVF _____ /sec
 Harmonic _____ /sec; Rad Grad _____ /sec, or
 _____ circular; HEAVY ION, E max = 28 q²/A
 WEIGHT, Fe 23 ton, Cu, or Al _____ tons
 POWER, main coils 60 kW, pole tips 7
 total 67 kW; cooled by water
 YOKE/POLE area _____ %; θ sec (Sect Mag) _____ deg
 TOTAL POWER, installed 0.9 MW
 normal load _____ MW

ION SOURCE, int PIG
 ext _____

ACCELERATION SYSTEM

DEES, number 2, width 90 deg
 BEAM APERTURE 2 cm; DC BIAS 2.5 kV
 TUNED by, coarse MSP, fine V.C.
 RF 6.0 to 25.5 MHz, stable ± 40 /10⁶
 Orb F _____ to _____ Mc/s; GAIN, (max) 100 kV/t
 HARMONICS, RF/OF, used _____
 DEE-Gnd, max _____ kV, x/field, min _____ cm,
 STABILITY, (pk-pk noise)/(pk RF volt) _____
 RF PHASE stable to ± _____ deg
 RF POWER input, max 75 kW
 RF PROTECT curcuit, speed 5 μs
 type Series Mod. Tube
 EXTRACT System electrostatic, mag.
channel

FREQUENCY MODULATION, rate _____ /sec
 MODULATOR, type _____
 BEAM PULSE, width _____ nsec

FM only

SELECTED REFERENCES

ENTRY NO.5 (cont.)

CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	p	24	24
	d	14	14
	α	28	28
		(μ A)	(μ A)
CURRENT Internal	p		145
	d		87
External	p	70	8.4
	d	100	100
	α	55	55
		(part/s)	(part/s)
Secondary			
HEAVIEST ion			

OTHER FEATURES and OPERATION SUMMARY

BEAM PROPERTIES

	Measured	Conditions
Pulse Width	_____ RF deg	_____ μ A of _____ MeV
Phase Exc, max	_____ RF deg	_____ μ A of _____ MeV
Extract Eff	82 %	6.6 μ A of 19 MeV p
Res, $\Delta E/E$	_____ %	_____ μ A of _____ MeV
Emittance	{ _____ axial } (mm-mrad) { _____ radial }	_____ μ A of _____ MeV
VACUUM norm	50 μ torr;	PUMPDOWN time 1 hr

OPERATING PROGRAMS, time dist

Basic Nuclear Physics/Chemistry	some	%
Solid State Physics		%
Bio-Medical Applications		%
Isotope Production	some	%
Materials Science		%
Test	100	%