

ENTRY No. 6 IPEN-CNEN/SP -
 NAME OF MACHINE Compact Cyclotron - CV - 28. DATE
 INSTITUTION Instituto de Pesquisas Energeticas e Nucleares - CNEN/SP
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 IN CHARGE G. Lucki REPORTED BY G. Lucki

HISTORY AND STATUS

DESIGN, date 1970 Model tests 1976
 ENG DESIGN, date 1970
 CONSTRUCTION, date 1975
 FIRST BEAM, date (or goal) 1981
 MAJOR ALTERATIONS none

COST, ACCELERATOR US 1×10^6
 COST, FACILITY, total US 2×10^6
 FUNDED BY Brazilian Government

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
 SCIENTISTS 3 ENGINEERS 2
 TECHNICIANS 2 CRAFTS 1

GRAD STUDENTS involved during year 7
 OPERATED BY Research staff or 5 Operators
 OPERATION 20 hr/wk, On target 3-5 hr/wk
 TIME DISTR. in house 100% Outside 0%

BUDGET, op & dev US 100,000
 FUNDED BY Brazilian Government

RESEARCH STAFF, not included above
 USERS, in house 6 outside none
 GRAD STUDENTS involved during year 7
 RESEARCH BUDGET, in house 7
 FUNDED BY 7

MAGNET

POLE FACE, diameter (compact) 96 cm, R extraction 42 cm
 R injection 1 cm
 GAP, min 5.1 cm, Field 14 kG }
 max 11.6 cm, Field 21 kG } at $0.23-10^6$
 AVERAGE FIELD at R ext 17 kG } Ampere turns
 B max/ 1.2

NUMBER OF SECTORS { compact } Spiral, max .. deg
 { separated 3 }
 SECTOR ANGLE (SSC) 60 deg
 TRIMMING COILS 4

CONDUCTOR, material and type Cu
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 65 max, kW; current stability 50 μ A
 trimming coils 54 max, kW; current stability 50 μ A
 WEIGHT: Fe 20.5 tons; coils 2.0 tons
 COOLING system Demineralized Water
 ION ENERGY (bending limit) E/A = q^2/a^2 MeV/amu
 (focusing limit) E/A = q^2/a^2 MeV/amu

ACCELERATION SYSTEM

DEES, number 2; angle 90 deg
 BEAM APERTURE 2.5 cm; DC Bias 15-2.5 kV
 TUNED by, coarse fine
 RF 6.6 to 25.9 MHz, stable \pm Better 0.01%
 Orb F 6.6 to 25.9 MHz
 HARMONICS, RF/Orb F, used fundamental
 DEE - Gnd, max kV, min gap cm
 STABILITY, (pk-pk noise)/(pk RF volt) 1%
 ENERGY GAIN, max kV/turn
 RF PHASE, stable to \pm deg
 RF POWER input, max 65 kW
 FREQUENCY MODULATION, rate /s
 modulator, type
 beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE $5 \cdot 10^{-5}$ Torr or mbar
 PUMPS, No, Type, Size 1 Diff. pump 12"

ION SOURCES

..... PIG or Thermoionic

INJECTION SYSTEM

Cold cathode - PIG or THERMOIONIC

EXTRACTION SYSTEM

Electrostatic bar + Magnetic Channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 80 m²; movable 180 m²
 TARGET STATIONS 2 in rooms 2
 STATIONS served at same time, max 1 (one)
 MAG SPECTROGRAPH, type
 COMPUTER model
 OTHER FACILITIES cooling system

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (μ A)	
	Goal	Achieved	Internal	External
P	24	24	300	40
a	28	28	50	25
He ³	36	36	50	25
d	14	14	3.0	0.5

SECONDARY (part/s)

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH RF deg μ A of MeV ions
 PHASE EXC, max RF deg μ A of MeV ions
 EXTRACT eff 75% max 30 μ A of 24 MeV P ions
 RESOL $\Delta E/E$ 0.5% μ A of MeV ions
 EMITTANCE
 (π mm. mrad) { 30 axial } μ A of MeV ions
 { 30 rad }

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS .. SOLID STATES PHYSICS ..
 BIOMEDICAL APPLICAT. .. ISOTOPE PRODUCTIONS 100%

REFERENCES/NOTES

- Lucki G; et al.
- 4th - Japan - Brasil Symposium on Science and Technology. - Sao Paulo Aug. 1984.

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS