ENTRY NO. 5 IPEN - Variable Energy
NAME OF MACHINE Cyclotron CV-28 DATE 7/25/81
INSTITUTION INSTITUTO DE PESQUISAS ENERGETICAS E. NUCLEARES
ADDRESS C.P. 11.049 - Pinheiros - CEP 05508 - Sao Paulo - Brasil
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IN CHARGE Dr. G. Lucki REPORTED BY G. Lucki - J.M. G. dos Santos

HISTORY AND STATUS
DESIGN, date 1970 Model tests July 1977
ENG DESIGN, date 1971
CONSTRUCTION, date 1976-1977
FIRST BEAM, date (or goal) April 23, 1981 (internal)
MAJOR ALTERATIONS None
COST, ACCELERATOR US 1.1 x 10^6
COST, FACILITY, total US 2.0 x 10^6
FUNDED BY Sao Paulo State Govmnt

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
SCIENTISTS 1 ENGINEERS 1
TECHNICIANS 3 CRAFTS -
GRAD STUDENTS involved during year -
OPERATED BY - Research staff or 4 Operators
OPERATION 10 hr/wk. On target - hr./wk
TIME DISTR. in house % Outside - %
BUDGET, op & dev
FUNDED BY Sao Paulo State Govmnt

RESEARCH STAFF, not included above
USERS, in house 8 outside -
GRAD STUDENTS involved during year
RESEARCH BUDGET, in house
FUNDED BY

MAGNET
POLE FACE, diameter (compact) 96 cm, R extraction 42 cm
R injection 2.5 cm
GAP, min 5.6 cm, Field 21 kG
max. 10.0 cm, Field 14.2 kG } at 0.20 x 10^{16} Ampere turns
AVERAGE FIELD at R ext 18.5 kG
B max/ < B > 1.14
NUMBER OF SECTORS compact ; separated 3 ; Spiral, max 50 deg
SECTOR ANGLE (SSC) deg
TRIMMING COILS 3
CONDUCTOR, material and type Copper
STORED ENERGY (cryogenic) MJ
POWER: main coils 75 max, kW; current stability 0.1%
trimming coils 50 max, kW; current stability 1.0%
WEIGHT: Fe 23 tons; coils 14 tons
COOLING system demineralized water
ION ENERGY (bending limit) E/A = q^2/a^2 MEV/amu
(focusing limit) E/A = q/a MeV/amu

ACCELERATION SYSTEM
DEES, number 2 ; angle 90 deg
BEAM APERTURE 2 cm; DC Bias 2.5 kV
TUNED by, coarse MSP fine VC
RF 6.0 to 25.5 mHz, stable ±
Orb F 6.0 to 25.5 mHz
HARMONICS, RF/Orb F, used 1
DEE—Gnd, max 30 kV, min gap 1.3 cm
STABILITY, (pk-pk noise)/(pk RF volt)
ENERGY GAIN, max 100 kV/turn
RF PHASE, stable to ± deg
RF POWER input, max 75 kW
FREQUENCY MODULATION, rate /s
modulator, type
beam pulse, width

VACUUM SYSTEM
OPERATING PRESSURE 10^{-5} Torr or mbar
PUMPS, No, Type, Size Diff. - one 12"-three 3"
Mechanical - Six

ION SOURCES
Penning

INJECTION SYSTEM
Electrostatic Injector

EXTRACTION SYSTEM
Electrostatic Deflector + Magnetic Channel

FACILITIES FOR RESEARCH
SHIELDED AREA, fixed 84 m^2; movable 184 m^2
TARGET STATIONS 3 in 3 rooms
STATIONS served at same time, max 1
MAG SPECTROGRAPH, type
COMPUTER model
OTHER FACILITIES Pneumatic "Rabbit" transfer station
Isotope Production Station Material Research Station

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
Protons	24	24	9.0	-
deuterons	14	14	6.8	-
He_{3++}	36	-	-	-
He_4	28	28	1.0	-
SECONDARY		(part/s)		

BEAM PROPERTIES

MEASURED		CONDITIONS
PULSE WIDTH	RF deg	pμ A of MeV ions
PHASE EXC. max	RF deg	pμ A of MeV ions
EXTRACT eff	%	pμ A of MeV ions
RESOL ΔE/E	%	pμ A of MeV ions
EMITTANCE (π mm. mrad)	axial / rad	pμ A of MeV

OPERATING PROGRAMS, time distribution
BASIC NUCLEAR PHYSICS 20% SOLID STATES PHYSICS 20%
BIOMEDICAL APPLICAT ISOTOPE PRODUCTIONS 40%
Development 20%

REFERENCES/NOTES
1)
2)

PLAN VIEW OF FACILITY, COMMENTS, ETC.