ENTRY NO. 4

NAME OF MACHINE Ciclotron de Energia Variavel DATE July 1981
INSTITUTION Instituto de Engenharia Nuclear
ADDRESS CP-2186 - ZC-00 - Rio de Janeiro - Brazil
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IN CHARGE Arthur Gerbasi da Silva REPORTED BY J.A.D. Furlanetto

HISTORY AND STATUS

DESIGN, date - Model tests -
ENG DESIGN, date The Cyclotron Corporation CV-28
CONSTRUCTION, date '71 - '74
FIRST BEAM, date (or goal) Dec. '74
MAJOR ALTERATIONS None

COST, ACCELERATOR US $ 0.5 x 10^8
COST, FACILITY, total US $ 1.3 x 10^8
FUNDED BY CNEN and FINEP - BRAZIL

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 1 ENGINEERS 1
TECHNICIANS 4 CRAFTS -
GRAD STUDENTS involved during year -
OPERATED BY - Research staff or 3 Operators
OPERATION 14 hr/wk. On target 9 hr./wk
TIME DISTR. in house 80 % Outside 20 %
BUDGET, op & dev US$ 50 x 10^3
FUNDED BY CNEN - BRAZIL

RESEARCH STAFF, not included above

USERS, in house 12 outside 9
GRAD STUDENTS involved during year 7
RESEARCH BUDGET, in house US$ 0.2 x 10^6
FUNDED BY CNEN

MAGNET

POLE FACE, diameter (compact) 96 cm, R extraction 42 cm
R injection - cm
GAP, min 5.6 cm, Field 21 kG
min - cm, Field 14.5 kG } at
AVERAGE FIELD at R ext 18.5 kG } Ampere turns
B max/ < B > -
NUMBER OF SECTORS { compact - / separated 3 } Spiral, max - deg
SECTOR ANGLE (SSC) - deg
TRIMMING COILS 4 Pairs

CONDUCTOR, material and type
STORED ENERGY (cryogenic) - MJ
POWER: main coils 60 max, kW; current stability 10^{-5}
trimming coils 10 max, kW; current stability
WEIGHT: Fe 23 tons; coils tons
COOLING system water
ION ENERGY (bending limit) E/A = 8 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 M.S.P. fine V.Cap
RF 6.5 to 25.5 mHz, stable ± $4/10^5$
Orb F to mHz
HARMONICS, RF/Orb F, used First
DEE—Gnd, max kV, min gap cm
STABILITY, (pk-pk noise)/(pk RF volt)
ENERGY GAIN, max 100 kV/turn
RF PHASE, stable to ± deg
RF POWEP input, max 75 kW
FREQUENCY MODULATION, rate /s
modulator, type
beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 5×10^{-5} Torr or mbar
PUMPS, No, Type, Size 1 Oil Diffusion Pump

ION SOURCES

P.I.G.

INJECTION SYSTEM

EXTRACTION SYSTEM

Electrostatic, mag. channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 70 m²; movable 220 m²
TARGET STATIONS 4 in 2
STATIONS served at same time, max -
MAG SPECTROGRAPH, type -
COMPUTER model -
OTHER FACILITIES

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
Protons	24	24	80	50
Alpha	28	28	64	45
^3He	36	36	50	35
Deuterons	14	14	80	50
SECONDARY		(part/s)		

BEAM PROPERTIES

	MEASURED		CONDITIONS			
PULSE WIDTH	54	RF deg	0.7	pμ A of 28	MeV	He^{++} ions
PHASE EXC. max	-	RF deg	-	pμ A of -	MeV	- ions
EXTRACT eff	82	%	6.6	pμ A of 19	MeV	H^+ ions
RESOL ΔE/E	0.36	%	0.7	pμ A of 28	MeV	He^{++} ions
EMITTANCE (π mm. mrad)	54 axial / 60 rad		0.2	pμ A of 28	MeV	He^{++}

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 40% SOLID STATES PHYSICS 20%
BIOMEDICAL APPLICAT - ISOTOPE PRODUCTIONS 40%

REFERENCES/NOTES

1)
2)

PLAN VIEW OF FACILITY, COMMENTS, ETC.