ENTRY NO. 34

NAME OF MACHINE Variable Energy Cyclotron

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IN CHARGE A.S. DIVATIA REPORTED BY A.S. DIVATIA

HISTORY AND STATUS

DESIGN, date 1967 Model tests

ENG DESIGN, date 1968-69

CONSTRUCTION, date 1969-77

FIRST BEAM, date (or goal) June 77 (Int) July 78 (Ext.)

MAJOR ALTERATIONS

COST, ACCELERATOR $ 3x10^6

COST, FACILITY, total $ 11x10^6

FUNDED BY Department of Atomic Energy

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 12 ENGINEERS 32

TECHNICIANS 58 CRAFTS 131

GRAD STUDENTS involved during year

OPERATED BY Research staff or 12 Operators

OPERATION 96 hr/wk. On target hr./wk

TIME DISTR. in house 6 % Outside %

BUDGET, op & dev $ 1.5 x 10^6

FUNDED BY Department of Atomic Energy

RESEARCH STAFF, not included above

USERS, in house 7 groups outside 20 groups

GRAD STUDENTS involved during year 10

RESEARCH BUDGET, in house

FUNDED BY Department of Atomic Energy

MAGNET

POLE FACE, diameter (compact) 224 cm, R extraction 99 cm

R injection cm

GAP, min 19 cm, Field 21 kG
min 30 cm, Field 14.1 kG
at 0.56 x 10^6 Ampere turns

AVERAGE FIELD at R ext 17.1 kG

B max/ < B >

NUMBER OF SECTORS compact 3
separated
Spiral, max 55 deg

SECTOR ANGLE (SSC) deg

TRIMMING COILS 17 pairs

CONDUCTOR, material and type Cu

STORED ENERGY (cryogenic) MJ

POWER: main coils 525 max, kW; current stability 0.01%
trimming coils 460 max, kW; current stability 0.01%

WEIGHT: Fe 275 tons; coils 10 tons

COOLING system LCW

ION ENERGY (bending limit) E/A = 140 q^2/a^2 MEV/amu
(focusing limit) E/A = 70 q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 1 180 deg

BEAM APERTURE 3.5 cm; DC Bias kV

TUNED by, coarse M.P. fine VC

RF 5.5 to 16.5* mHz, stable ± 1 in 10^7

Orb F to mHz

HARMONICS, RF/Orb F, used

DEE—Gnd, max 60 kV, min gap 6.19 cm

STABILITY, (pk-pk noise)/(pk RF volt)

ENERGY GAIN, max 120 kV/turn

RF PHASE, stable to ± deg

RF POWEP input, max 300* kW

FREQUENCY MODULATION, rate /s

modulator, type

beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 3×10^{-6} Torr or mbar

PUMPS, No, Type, Size Two 39 cm dia oil diffusion pumps

ION SOURCES

PIG - Hot filament

INJECTION SYSTEM

Internal Ion Source

EXTRACTION SYSTEM

DC Electrostatic Deflector

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 226 m²; movable 535 m²

TARGET STATIONS 9 in 4

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type QSD (under construction)

COMPUTER model IRIS-80, ND-500 (planned)

OTHER FACILITIES

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
He^{++}	140	100	5	-
		85		1.5
		30	55	15
SECONDARY		(part/s)		

BEAM PROPERTIES

MEASURED		CONDITIONS			
PULSE WIDTH	10 RF deg	1.1 pμ A of	40 MeV	He^{++}	ions
PHASE EXC. max	RF deg	pμ A of	MeV		ions
EXTRACT eff	35 %	15 pμ A of	30 MeV	He^{++}	ions
RESOL ΔE/E	1 %	10 pμ A of	30 MeV	He^{++}	ions
EMITTANCE (π mm. mrad)	19.9 axial, 28.6 rad	pμ A of	MeV		

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 72% SOLID STATES PHYSICS 14%

BIOMEDICAL APPLICAT ISOTOPE PRODUCTIONS 2,4%

REFERENCES/NOTES

1) Operation and Utilization of the Variable
2) Energy Cyclotron at Calcutta - Santimay Chatterjee et.al - 9th Int. Conf. on Cyclotrons & Their Applications, Sept. 1981, Caen.

PLAN VIEW OF FACILITY, COMMENTS, ETC.

* Design value