ENTRY NO. 39

NAME OF MACHINE ..... CHANDIGARH VARIABLE ENERGY CYCLOTRON.....
INSTITUTION ..... Department of Physics, Punjab University.....
ADDRESS ..... Chandigarh, 160014, India.....
TEL 22741..... TELEX .....
IN CHARGE Prof. I.M. Govil ..... REPORTED BY ... I.M. Govil & H.S. Hans.....

HISTORY AND STATUS

DESIGN, date ..... 1953-54... Model tests . Rochester, U.S.A.
ENG DESIGN, date .. 1969-72, Chandigarh, India.....
CONSTRUCTION, date 1972-75, Chandigarh, India.....
FIRST BEAM, date (or goal) .... 1973; running since 1976...
MAJOR ALTERATIONS . (i) Vacuum pumps added;.....
..... (ii) Water Cooling System added; (iii) Renovation
COST, ACCELERATOR .....
COST, FACILITY, total .. $. 600,000.....
FUNDED BY ..... U.G.C. India.....

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS ..... 4..... ENGINEERS ..... 3.....
TECHNICIANS ..... 5..... CRAFTS ..... 3.....
GRAD STUDENTS involved during year ..... 4.....
OPERATED BY S.R. Bahadur Research staff or ..... Operators
OPERATION ..... hr/wk. On target ..... hr/wk
TIME DISTR. in house ..... 70... %, outside ..... 30..... %
BUDGET, op & dev .. U.G.C. and University Rs(100,000-...
FUNDED BY .. U.G.C./ University .....150,000p.a.)

RESEARCH STAFF, not included above

USERS, in house ..... 5..... outside ..... 6.....
GRAD STUDENTS involved during year ..... 3.....
RESEARCH BUDGET, in house ..... Rs. 100,000.....
FUNDED BY .. Schemes from DAE, DST, VEC, U.G.C.....

MAGNET

POLE FACE, diameter (compact) ..67.5... cm, R-extraction .. 55 .. cm
R injection ..... cm
GAP, min .15.. cm, Field ..14... kG
max ..... cm, Field ..... kG } at ...400.....
AVERAGE FIELD at R ext ....14... kG — Ampere turns
B max/<B> .....
NUMBER OF SECTORS { compact ..... / separated ..... } Spiral, max ... deg
SECTOR ANGLE (SSC) ..... deg
TRIMMING COILS .. It is classical single pole, single dee
..... machine..
CONDUCTOR, material and type . Copper hollow square cross-section
STORED ENERGY (cryogenic) ..... MJ
POWER: main coils .40.. max kW: current stability .....
trimming coils ..... max kW: current stability .....
WEIGHT: Fe .....20..... tons: coils ..... tons
COOLING system closed loop, Deionized cooled water system
ION ENERGY (Bending limit) E/A = ... q^2/A^2 MeV/amu at 0°c
(Focusing limit) E/A = ... q/A MeV/amu

ACCELERATION SYSTEM

DEES, number ..... one..... angle ..... deg
BEAM APERTURE . At .. ≤0.3.. cm; DC Bias ...30-40..... kV
TUNED by, coarse target shooting box .....
RF .....10..... to .....20..... MHz, stable ± .....
Orb F ..... to ..... MHz
HARMONICS, RF/Orb F, used .....
DEE–Gnd, max ..... kV, min gap ..... cm
STABILITY, (pk-pk noise)/(pk RF volt) .....
ENERGY GAIN, max ..... kV/turn
RF PHASE, stable to ± ..... deg
RF POWER input, max. 25 kVA..... kW
FREQUENCY MODULATION, rate ..... /s
modulator, type .....
beam pulse, width .....

VACUUM SYSTEM

OPERATING PRESSURE .....$\times 10^{-5}$..... Torr or mbar
PUMPS, No, Type, Size .....
.....8 Diffusion Pumps.....
.....

ION SOURCES

.....Hooded Arc type.....

INJECTION SYSTEM

..... Dee-feelers .....

EXTRACTION SYSTEM

..... D.C. Deflector .....

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed ..... m^2; movable ..... m^2
TARGET STATIONS one working, ... ½/second under rooms
STATIONS served at same time, max one . construction in one room.
MAG SPECTROGRAPH, type No mag. spectrograph.....
COMPUTER model .....
OTHER FACILITIES .....
.....
.....

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p	8	4.8	.....	.....
d	4	4	.....	.....
He-3	11	10	.....	.....
α	8	8	.....	.....
SECONDARY			(part/s)	
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

BEAM PROPERTIES

MEASURED		CONDITIONS	
PULSE WIDTH .... RF deg	500.	pμA of .. 4.. MeV .. p...	ions
PHASE EXC. max .. RF deg	500.	pμA of .. 4.. MeV .. d...	ions
EXTRACT eff ..... %	100.	pμA of .. 8.. MeV .. α...	ions
RESOL ΔE/E . ≤1.. %	.50.	pμA of . 10.. MeV . He^3..	ions
EMITTANCE			
(π mm-mrad) .... axial	....	pμA of ..... MeV	
.... rad			

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 70%. SOLID STATES PHYSICS/Atomic Physics20%
BIOMEDICAL APPLICAT.. 10%. ISOTOPE PRODUCTIONS None....
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REFERENCES/NOTES

1) Govil I.M.& Hans H.S.1976,Phys. News(India)7,48
2) Govil I.M.& S.H.S.1980, Proceedings of the Indian Academy of Sciences(Eng. section) V.3, 237

PLAN VIEW OF FACILITY, COMMENTS, ETC.

I M Govil and H S Hans