ENTRY NO. 124 Kazakhstan Variable Energy
NAME OF MACHINE ..... Isochronous Cyclotron .... DATE .. July ., 1981 .....
INSTITUTION ..... Institute of Nuclear Physics, Kazakhtan Academy of Sciences .....
ADDRESS ..... Alma-Ata, 480082, USSR .....
TEL .... 690 243 ..... TELEX .....
IN CHARGE .. A.A. Arzumanov ..... REPORTED BY .. A.A. Arzumanov .....

HISTORY AND STATUS
DESIGN, date ..... 1966 ..... Model tests ... 1966-1968 .....
ENG DESIGN, date .. 1967-1969 .....
CONSTRUCTION, date 1970-1971 .....
FIRST BEAM, date (or goal) .... September. 1971 .....
MAJOR ALTERATIONS .....
.....
COST, ACCELERATOR .....
COST, FACILITY, total .....
FUNDED BY ... Kazakhstan. Academy. of. Sciences .....

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT
SCIENTISTS ..... ENGINEERS .....
TECHNICIANS ..... CRAFTS .....
GRAD STUDENTS involved during year .....
OPERATED BY ..... Research staff or ..... Operators
OPERATION ... 160 ... hr/wk. On target .... 135 ..... hr/wk
TIME DISTR. in house .. 85 ..... %, outside ..... 15 ..... %
BUDGET, op & dev .....
FUNDED BY ... Kazakhstan. Academy. of. Sciences .....

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

MAGNET
POLE FACE, diameter (compact) ... 150 .. cm, R-extraction . 66.5 cm
R injection ..... cm
GAP, min . 21 . cm, Field .. 19..2. kG
max . 35 . cm, Field .. 12..2. kG } at . 5..10^5 .....
AVERAGE FIELD at R ext .... 15.6 kG Ampere turns
B max/ < B > .....
NUMBER OF SECTORS { compact ... 3 .. / separated ..... } Spiral, max 25. deg
SECTOR ANGLE (SSC) ..... deg
TRIMMING COILS .. 9 circular .....
..... 2 harmonic per sector .....
CONDUCTOR, material and type .... copper .....
STORED ENERGY (cryogenic) ..... MJ
POWER: main coils . 275 max kW: current stability .. 10-4.
trimming coils .. 50 max kW: current stability .. 10-4.
WEIGHT: Fe ..... tons: coils ..... tons
COOLING system ..... water .....
ION ENERGY (Bending limit) E/A = .. 50 ..... q^2/A^2 MeV/amu
(Focusing limit) E/A = .. 30 ..... q/A MeV/amu

ACCELERATION SYSTEM
DEES, number ..... 2 .....; angle ..... 180 ..... deg
BEAM APERTURE .. 7 ..... cm; DC Bias ..... kV
TUNED by, coarse .. mov.. short. ... fine ... Var.. cap.. auto
RF ..... 8.5 .. to .. 19.0 .... MHz, stable ± ... 10^{-6} .....
Orb F ... 8.5 ..... to .. 19.0 ..... MHz
HARMONICS, RF/Orb F, used ..... 1 .....
DEE–Gnd, max .... 80 ..... kV, min gap ..... 3.9 .... cm
STABILITY, (pk-pk noise)/(pk RF volt) ..... 0.01 .....
ENERGY GAIN, max ..... 320 .. kV/turn
RF PHASE, stable to ± ..... deg
RF POWER input, max. ..... 300 .. kW
FREQUENCY MODULATION, rate ..... /s
modulator, type .....
beam pulse, width .....

VACUUM SYSTEM
OPERATING PRESSURE ..... 8.10^{-6} ..... Torr or mbar
PUMPS, No, Type, Size .. diffusion. pumps .....
..... (two. 50. cm,. five. 16. cm) .....
.....

ION SOURCES
..... Internal,. hot. filament,. hooded .....

INJECTION SYSTEM
.....

EXTRACTION SYSTEM
.radially.focusing.dc.reflector,.magnetic.chan.....

FACILITIES FOR RESEARCH
SHIELDED AREA, fixed ... 132 .. m^2; movable ..... m^2
TARGET STATIONS ..... 2 ..... in ..... 2 ..... rooms
STATIONS served at same time, max .....
MAG SPECTROGRAPH, type .....
COMPUTER model .....
OTHER FACILITIES .....
.....
.....

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
p	.....	.6-30 .	.200 ...	...30 .....
d	.....	.12-25 .	.150 ...	...30 .....
He-3	.....	.19-62 .	...20 ...	...10 .....
He-4	.....	.25-51 .	...40 ...	...20 .....
SECONDARY			(part/s)	
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

BEAM PROPERTIES

MEASURED		CONDITIONS		
PULSE WIDTH	.35 RF deg	.20	pμA of .30 .. MeV	.p ... ions
PHASE EXC. max	.. RF deg	....	pμA of ..... MeV	..... ions
EXTRACT eff	.60 . %	....	pμA of ..... MeV	..... ions
RESOL ΔE/E	.0.6 . %	....	pμA of ..... MeV	..... ions
EMITTANCE				
(π mm-mrad)	.16 . axial .16 . rad	.15 .	pμA of .30 .. MeV	.p ...

OPERATING PROGRAMS, time distribution
BASIC NUCLEAR PHYSICS .40 . SOLID STATES PHYSICS ... 45 ..
BIOMEDICAL APPLICAT..... ISOTOPE PRODUCTIONS ... 10 ..
.Development .....5 .....
.....

REFERENCES/NOTES

A.A. Arzumanov, L.M. Nemenov,
Nucl. Instr. Metho. 166 (1973) 201

PLAN VIEW OF FACILITY, COMMENTS, ETC.

Conversion of 150 cm FF machine.

^{3}He recovery system.

Radioisotope production.