

ENTRY NO. C37 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 . 5.10⁵
AVERAGE FIELD at R ext . . 15.6 . kG } Ampere turns
B max / < B >
NUMBER OF SECTORS { compact . . 3 . . } Spiral, max 25 . deg
{ separated }
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 q²/A³ 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 $\pm$. 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 $\pm$ 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 . . m², movable m²
TARGET STATIONS 2 in . . . 2 rooms
STATIONS served at same time, max
MAG SPECTROGRAPH, type
COMPUTER model
OTHER FACILITIES

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (μ A)	
	Goal	Achieved	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 . . μ A of . 30 . . MeV . . p . . ions				
PHASE EXC. max . . RF deg μ A of MeV ions				
EXTRACT eff. . 60 . % μ A of MeV ions				
RESOL $\Delta E/E$. 0.6 . % μ A of MeV ions				
EMITTANCE				
(π mm-mrad) . 16 . axial . . 15 . . μ A of . 30 . . MeV . . p . .				
. 16 . rad				

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.

³He recovery system.

Radioisotope production.