

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 5.10⁵
 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/A² 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 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 (pA)	
	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 pA of .30 MeV .p ions
 PHASE EXC, max RF deg pA of MeV ions
 EXTRACT eff .60 % pA of MeV ions
 RESOL ΔE/E .06 % pA of MeV ions
 EMITTANCE
 (π mm-mrad) .16 axial .15 pA 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.