ENTRY NO. 90

Kazachstan

NAME OF MACHINE Variable Energy Isochronous Cyclotron DATE Nov. 1973

INSTITUTION Institute of Nuclear Physics

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IN CHARGE L. M. Nemenov REPORTED by A. A. Arzumanov

HISTORY AND STATUS

DESIGN, date 1966 MODEL tests 1966-1968

ENG. DESIGN, date 1967-69

CONSTRUCTION, date 1970-71

FIRST BEAM date (or goal) September 1971

MAJOR ALTERATIONS See below

OPERATION, 160 hr/wk; On Target _____ hr/wk

TIME DIST., in house _____ %, outside _____ %

USERS' SCHEDULING CYCLE _____ weeks

COST, ACCELERATOR _____

COST, FACILITY, total _____

FUNDED BY _____

ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS _____ ENGINEERS _____

TECHNICIANS _____ CRAFTS _____

GRAD STUDENTS involved during year _____

OPERATED BY _____ Res staff or _____ Operators

BUDGET, op & dev _____

FUNDED BY _____

RESEARCH STAFF, not included above

USERS, in house _____ outside _____

GRAD STUDENTS involved during year _____

RES. BUDGET, in house _____

FUNDED BY _____

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed _____ m^2

movable _____ m^2

TARGET STATIONS _____ in _____ rooms

STATIONS served at same time, max _____

MAG SPECTROGRAPH, type _____

COMPUTER, model _____

OTHER FACILITIES _____

REFERENCES/NOTES

L.M. Nemenov, A.A. Arzumanov, and P.A. Bersenev, IEEE Trans. Nucl. Sci., NS-13, 4 (1966) 411.

A. A. Arzumanov, L.M. Nemenov, Nucl. Inst. and Meth. 106 (1973) 201.

* MS - moving short circuit;
VC - variable capacitor

MAGNET

POLE FACE diameter 150 cm; R extraction 66.5 cm

GAP, min 21 cm; Field 20 kG
max 35 cm; Field 12 kG
AVERAGE FIELD at R ext 16.2 kG
} at _____ X 10^6 ampere turns

CURRENT STABILITY _____ parts/10^6; $B_{max}/\langle B \rangle$ _____

NUMBER OF SECTORS 3 ; SPIRAL, max low deg

POLE FACE COIL PAIRS: AVF _____ /sec;

Harmonic correction 2

Rad grad _____ /sec or Circ coils 9

WEIGHT: Fe _____ tons; Coils _____ tons

CONDUCTOR, Material and type _____

STORED ENERGY _____ MJ

COOLING SYSTEM water

POWER: Main coils 300 max, kW

Trimming coils 50 max, kW

YOKE/POLE AREA _____ %

SECTOR ANGLE (Sep Sec) _____ deg

ION ENERGY (Bending limit) E/A = _____ q^2/A^2 MeV

(Focusing limit) E/A = _____ q/A MeV

ACCELERATION SYSTEM

DEES, number 2 angle 180 deg

BEAM APERTURE 7 cm; DC BIAS _____ kV

TUNED by, coarse MS* fine VC auto *

RF 8.5 to 19.0 mHz, stable ± _____ /10^6

Orb F 8.5 to 19.0 mHz; GAIN, max 320 kV/turn

HARMONICS, RF/Orb F, used _____

DEE-Gnd, max 80 kV, min gap _____ cm

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

RF PHASE stable to ± _____ deg

RF POWER input, max _____ kW

RF PROTECT circuit, speed _____ μsec

Type _____

FREQUENCY MODULATION, rate _____ /sec

MODULATOR, type _____

BEAM PULSE, width _____

VACUUM SYSTEM

PUMPS, No., Type, Size _____

OPERATING PRESSURE _____ μTorr,

PUMPDOWN TIME _____ hrs

ION SOURCES/INJECTION SYSTEM

Hot filament, hooded

EXTRACTION SYSTEM

Radially focusing dc deflector,

CONTROL SYSTEM magnetic channel

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CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	p		6-30
	^{3}He		19-62
	α		
CURRENT		(μA)	(μA)
Internal	p		200
	^{3}He		20
	α		40
External	p		30
	^{3}He		10
	α		20
		(part/s)	(part/s)
Secondary			

BEAM PROPERTIES

	Measured		Conditions
Pulse Width	____ RF deg	____ μA of ____ MeV	____
Phase Exc, max	____ RF deg	____ μA of ____ MeV	____
Extract Eff	60 %	____ μA of ____ MeV	____
Res, ΔE/E	0.6 %	____ μA of ____ MeV	____

Emittance

(mm-mrad) { 16 axial / 16 radial } 15 μA of 30 MeV p

OPERATING PROGRAMS, time dist

Basic Nuclear Physics ____ %
Solid State Physics ____ %
Bio-Medical Applications ____ %
Isotope Production ____ %
Development ____ %
____ %
____ %

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, OPERATION SUMMARY, ADDITIONAL REFERENCES

Features:

Conversion of 150 cm FF machine.
Two puller slits with moveable slit in central region for phase defining.
Circular coils in separate vacuum box.
^{3}He recovery system.