

ENTRY NO. 110
 NAME OF MACHINE U-400
 INSTITUTION Joint Institute for Nuclear Research
 ADDRESS Dubna, UUSR
 TEL TELEX MSK DUBNA 412621
 IN CHARGE G.N.FLEROV REPORTED BY

HISTORY AND STATUS

DESIGN, date Model tests
 ENG DESIGN, date 1973-1977
 CONSTRUCTION, date 1974-1978
 FIRST BEAM, date (or goal) 1978
 MAJOR ALTERATIONS

COST, ACCELERATOR
 COST, FACILITY, total
 FUNDED BY

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS ENGINEERS
 TECHNICIANS CRAFTS
 GRAD STUDENTS involved during year
 OPERATED BY Research staff or Operators
 OPERATION 80 hr/wk. On target 65 hr/wk
 TIME DISTR. in house % Outside %
 BUDGET, op & dev
 FUNDED BY

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) 400 cm, R extraction 172 cm
 R injection cm
 GAP, min 4.2 cm, Field 26 kG }
 min 30 cm, Field 16 kG } at $1,26 \times 10^6$
 AVERAGE FIELD at R ext 21.4 kG } Ampere turns
 B max/ < B > 1,21

NUMBER OF SECTORS { compact 4 } Spiral, max 7 deg
 { separated - }
 SECTOR ANGLE (SSC) deg

TRIMMING COILS 10 circular
 8 harmonic

CONDUCTOR, material and type Al
 STORED ENERGY (cryogenic) MJ
 POWER: main coils 850 max, kW; current stability 10-3
 trimming coils 56 max, kW; current stability 10-3

WEIGHT: Fe 2000 tons; coils 40 tons
 COOLING system Demineralized water
 ION ENERGY (bending limit) E/A = 62.5 q²/a² MEV/amu
 (focusing limit) E/A = 3.5 q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 2, 420 deg
 BEAM APERTURE 4.2 cm; DC Bias 0 kV
 TUNED by, coarse MS fine VC-5
 RF 6 to 12 MHz, stable ± 10-5
 Orb F 1.5 to 12 MHz
 HARMONICS, RF/Orb F, used 1, 2, 3, 4
 DEE-Gnd, max 100 kV, min gap 8-3 cm
 STABILITY, (pk-pk noise)/(pk RF volt) 10
 ENERGY GAIN, max 400 kV/turn
 RF PHASE, stable to ± 2 deg
 RF POWER input, max 150 kW
 FREQUENCY MODULATION, rate /s
 modulator, type -
 beam pulse, width -

VACUUM SYSTEM

OPERATING PRESSURE 1×10^{-6} Torr or mbar
 PUMPS, No, Type, Size 5 oil diffusion pumps
 4000 l s⁻¹ each

ION SOURCES

Arc type with heated cathode

INJECTION SYSTEM

EXTRACTION SYSTEM

Stripping + magnetic channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 400 m²; movable m²
 TARGET STATIONS 15 in 7
 STATIONS served at same time, max 1
 MAG SPECTROGRAPH, type
 COMPUTER model Intel-8080
 OTHER FACILITIES

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (pμA)	
	Goal	Achieved	Internal	External
14 N ²⁺		176	30	25
48 Ni ⁵⁺		269	7	2.5
58 Fe ⁶⁺		298	3.5	1.2
76 Ge ⁸⁺		400	0.3	0.1

SECONDARY (part/s)

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH 30 RF deg μA of MeV ions
 PHASE EXC. max RF deg μA of MeV ions
 EXTRACT eff 30-70% μA of MeV ions
 RESOL ΔE/E 1% μA of MeV ions
 EMITTANCE { 80 axial } μA of MeV
 { 40 rad }

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 100 SOLID STATES PHYSICS
 BIOMEDICAL APPLICAT ISOTOPE PRODUCTIONS

REFERENCES/NOTES

- 1) Proc. of the VIIIth All-Union Meeting on Charged Particle
- 2) Accelerators, Dubna, v.1, 47, 1983

PLAN VIEW OF FACILITY, COMMENTS, ETC.