

ENTRY NO. **C49** Date **November 1995**
 Name of Machine **U-400M**
 Institution **Joint Institute for Nuclear Research, Flérov Laboratory of Nuclear Reactions**
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 In Charge: **G Gulbekian** Reported by: **B Gikal**

HISTORY

MILESTONE DATES:
 Design 1985-1987 Model Tests
 Construction 1987-1990 First Beam 1991
DESIGN/CONSTRUCTION BY:
 in house other
COST: Accelerator Facility
FUNDED BY:

STATUS

STAFF: Machine
 Scientists 3 Engineers 5
 Technicians 10 Students 2
 Research (in house/external)
 Scientists / Engineers /
 Technicians / Students /
BUDGET: Machine Funded by
 Research Funded by

TIME DISTRIBUTION:

Basic Research (in house/external) 45 % / 30 %
 Applied Program (in house/external) % / %
 Maintenance 5 % Development 20 %

MAGNET

POLE PARAMETERS:
 Diameter 400 cm $R_{extract}$ 175 cm R_{inject} cm
HILL PARAMETERS: Gap (min) 10 cm B_{max} 2.55 T
 (@ AT) Gap (max) cm B_{min} T
VALLEY PARAMETERS: Gap (min) cm B_{max} T
 (@ AT) Gap (max) 50 cm B_{min} 1.4 T
AVERAGE FIELD: $\langle B \rangle_{min}$ 1.5 T $\langle B \rangle_{max}$ 1.93 T
NUMBER OF SECTORS: compact/separated 4 /
 sector angle 45 deg. spiral (max) 40 deg.
FIELD TRIMMING: Trim Coils 15
 Harmonic Coils 5
 Other
CURRENT: Main Coils 2200 Amps Stability 10^{-4}
 Trim Coils 30 Amps Stability 10^{-3}
 Stored Energy (cryogenic) MJ
WEIGHT: Iron 2100 Conductor 115
ION ENERGY: Bending Limit $E/A = 400-540$ q²/A² MeV/u
 Focusing Limit $E/A = 200$ q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:
 Description: 4 Dees system, MS
 No. of Gaps/turn 8 $dE/dn(max)$ 0.8 MeV/q
 Voltage (max) 0.15-0.2 MV Harmonic f_H/f_{ion} 2, 3, 4
 Freq 11.5-24.5 MHz Power in(max) 0.4 MW
 Stability: Phase 1° Voltage 10^{-3}
OTHER CAVITIES (Flattopping or otherwise):
 Description:
 Region of Influence: R_{min} cm R_{max} cm
 No. of Gaps/turn $dE/dn(max)$ MeV/q
 Voltage (max) MV Harmonic f_H/f_{ion}
 Freq MHz Power in(max) MW
 Stability: Phase Voltage

VACUUM SYSTEM

OPERATING PRESSURE: (0.5-1) 10^{-6} mbar
PUMPS: (No. and type) 20,000 l/s for N₂

ION SOURCE(S)

Type	Intensity (mA)	@ (mm mrad)	$\epsilon_n = \beta\gamma\epsilon$ (mm mrad)	Ion Species
(a) ECR-4M(14.5CHz)				
(b)				
(c)				
(d)				

INJECTION SYSTEM

Axial injection, elect.mirror (1995) Efficiency %
 spiral inflector (1996)

EXTRACTION SYSTEM

Stripping, magnetic deflectors Efficiency %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μA)	
		Internal	External
(a) ⁶ Li ²⁺	50	1.5	0.7
(b) ¹⁴ N ⁵⁺	60	0.15	0.13
(c)			
(d)			

Secondary Particles	E (MeV)	part/sec
(a) ⁶ He	300	10^5
(b)		
(c)		

EXTRACTED BEAM PROPERTIES:

For μA of MeV/u ions
 $\Delta E/E$ $2 \cdot 10^{-3}$ % $\Delta\phi$ 20 °rf
 $\epsilon_n = \beta\gamma\epsilon$ x 10^6 π mm mrad z 10^6 π mm mrad

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed: 1800 m² Moveable m²
 Target Stations: 6 No. Served At Same Time: 1
MAGNETIC SPECTROMETERS:
OTHER FACILITIES: 4 π -detector array of charged particles and nuclei FOBOS, high resolution fragment separator COMBAS

REFERENCES/NOTES

(a) Proc. 13th Int. Conf. on Cyclotrons, p.11
 (b)

PLAN VIEW OF FACILITY, COMMENTS