

ENTRY NO. 106

NAME OF MACHINE **K500**
 INSTITUTION **MICHIGAN STATE UNIVERSITY**
 ADDRESS **NSCL/CYCLOTRON LABORATORY, EAST LANSING, MICHIGAN 48824-1321 USA**
 TEL **517-355-9671** TELEX **5106019207 NATSUPCYCLAB**
 IN CHARGE **H. BLOSSER** REPORTED BY **P. MILLER**

HISTORY AND STATUS

DESIGN, date **74-79** Model tests **75-77**
 ENG DESIGN, date **75-81**
 CONSTRUCTION, date **77-81**
 FIRST BEAM, date (or goal) **8/82**
 MAJOR ALTERATIONS

COST, ACCELERATOR **\$2,900,000**
 COST, FACILITY, total **\$3,500,000**
 FUNDED BY **National Science Foundation**

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS ENGINEERS
 TECHNICIANS CRAFTS
 GRAD STUDENTS involved during year
 OPERATED BY Research staff or Operators
 OPERATION hr/wk. On target 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) **142** cm, R-extraction **67** cm
 R injection cm
 GAP, min **6.35** cm, Field **58** kG
 max **91.4** cm, Field **43** kG at **4,681,600**
 AVERAGE FIELD at R ext **49.5** kG Ampere turns
 B max /
 NUMBER OF SECTORS {compact **3** } Spiral, max **120** deg
 {separated }

SECTOR ANGLE (SSC) deg
 TRIMMING COILS **14** (1 circular, 13 hill)

CONDUCTOR, material and type **NbTi in Cu**
 STORED ENERGY (cryogenic) **18** MJ
 POWER: main coils **0** max kW; current stability **1/10⁵**
 trimming coils **80** max kW; current stability **5/10⁴**
 WEIGHT: Fe **100** US tons; coils **8** US tons
 COOLING system **Helium bath**
 ION ENERGY (Bending limit) E/A = **520** q²/A² MeV/amu
 (Focusing limit) E/A = **160** q/A MeV/amu

ACCELERATION SYSTEM

DEES, number **3** angle **53** deg
 BEAM APERTURE **2.5** cm; DC Bias kV
 TUNED by, coarse **sliding short** fine **capacitive blade**
 RF **9.0** to **27.5** MHz, stable ± **1/10⁷**
 Orb F **1.3** to **27.5** MHz
 HARMONICS, RF/Orb F, used **1,2,3,4,5,7**
 DEE-Gnd, max **100** kV, min gap **1.0** cm
 STABILITY, (pk-pk noise)/(pk RF volt) **1/10,000**
 ENERGY GAIN, max **600** kV/turn
 RF PHASE, stable to ± **0.5** deg
 RF POWER input, max **3 x 140** kW
 FREQUENCY MODULATION, rate /s
 modulator, type
 beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE **3 x 10⁻⁶** Torr or mbar
 PUMPS, No, Type, Size **2 cryopanel 4.5K (charcoal)**
100 K shield 20 x 50 cm mounted in dee +
3 turbo-molecular pumps

ION SOURCES

ECR; PIG

AXIAL

INJECTION SYSTEM
 buncher and spiral DC inflector

EXTRACTION SYSTEM
 precessional & 2 electrostatic deflectors

FACILITIES FOR RESEARCH + 9 iron channels

SHIELDED AREA, fixed m²; movable **600** m²
 TARGET STATIONS **7** in **2** rooms

STATIONS served at same time, max **1**

MAG SPECTROGRAPH, type **Engel Splitpole & S320**

COMPUTER model **Vax 11/750 & 11/780**

OTHER FACILITIES **Reaction Product Mass Separator**

60" scattering chamber, γ-ray, goniometer,

neutron TOF.

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV)		CURRENT (pμA)	
	Goal	Achieved	Internal	External
4 He ⁺⁺	320	215		05
12 C ⁵⁺	800	600		004
22 Ne ⁷⁺	1100	770		04
86 Kr ¹⁹⁺	2100	1720		0001
SECONDARY			(part/s)	

BEAM PROPERTIES

MEASURED CONDITIONS
 PULSE WIDTH **35** RF deg **04** μA of **420** MeV **14,4+** ions
 PHASE EXC. max RF deg μA of MeV **14,5+** ions
 EXTRACT eff. **50** % **05** μA of **490** MeV ions
 RESOL ΔE/E % μA of MeV ions
 EMITTANCE
 (π mm-mrad) axial μA of MeV
 rad

OPERATING PROGRAMS, time distribution
 BASIC NUCLEAR PHYSICS **85** % SOLID STATES PHYSICS **0**
 BIOMEDICAL APPLICAT. **5** % ISOTOPE PRODUCTIONS **0**
 Accel. develop. **5** % ECR source devel. **5** %

REFERENCES/NOTES

- 1) IEEE Trans. on Nuc. Sci. NS-26 (1979) 2040
- 2) MSU Annual Reports 1974-1985

PLAN VIEW OF FACILITY, COMMENTS, ETC.

