

**ENTRY No. 77**

NAME OF MACHINE K800 DATE 8/1/81  
 INSTITUTION Michigan State University  
 ADDRESS Cyclotron Laboratory, East Lansing, Michigan 48824 USA  
 TEL 517-355-9671 TELEX  
 IN CHARGE H. Blosser REPORTED BY H. Blosser

**HISTORY AND STATUS**

DESIGN, date 76-82 Model tests  
 ENG DESIGN, date 79-83  
 CONSTRUCTION, date 80-84  
 FIRST BEAM, date (or goal) 12/83  
 MAJOR ALTERATIONS

COST, ACCELERATOR \$6,400,000  
 COST, FACILITY, total \$33,000,000  
 FUNDED BY Department of Energy

**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) 219.7 cm, R extraction 103 cm  
 R injection 22 cm  
 GAP, min 7.6 cm, Field 62 kG }  
 max 91.4 cm, Field 47 kG } at 7,200,000  
 AVERAGE FIELD at R ext 53 kG } Ampere turns  
 B max/ <B>

NUMBER OF SECTORS { compact 3 } Spiral, max 18.0 deg  
 separated }  
 SECTOR ANGLE (SSC) deg  
 TRIMMING COILS 22

CONDUCTOR, material and type NbTi in Cu  
 STORED ENERGY (cryogenic) 60 MJ  
 POWER: main coils 0 max, kW; current stability 1/10<sup>5</sup>  
 trimming coils 100 max, kW; current stability 1/10<sup>4</sup>  
 WEIGHT: Fe 265 US tons; coils 14 US tons  
 COOLING system Helium bath  
 ION ENERGY (bending limit) E/A = ±1200 \* q<sup>2</sup>/a<sup>2</sup> MeV/amu  
 (focusing limit) E/A = .400 q/a MeV/amu

**ACCELERATION SYSTEM**

DEES, number 3; angle 53 deg  
 BEAM APERTURE cm; DC Bias kV  
 TUNED by, coarse sliding short fine capacitive blade  
 RF 9 to 27.5 MHz, stable ± 1/10<sup>7</sup>  
 Orb F 4.5 to 27.5 MHz  
 HARMONICS, RF/Orb F, used 1, 2  
 DEE - Gnd, max 200 kV, min gap 2.5 cm  
 STABILITY, (pk-pk noise)/(pk RF volt) 1/10,000  
 ENERGY GAIN, max 1040 kV/turn  
 RF PHASE, stable to ± deg  
 RF POWER input, max 3 x 200 kW  
 FREQUENCY MODULATION, rate /s  
 modulator, type  
 beam pulse, width

**VACUUM SYSTEM**

OPERATING PRESSURE 1 x 10<sup>-7</sup> Torr or mbar  
 PUMPS, No, Type, Size 3 cryopumps, 4, 5K

**ION SOURCES**

PIG (for cyclotron testing)

\* depends on relative excitation of split main coil

**INJECTION SYSTEM**

Internal stripping foil

**EXTRACTION SYSTEM**

Precessional & 2 electrostatic deflectors & 9 iron channels.

**FACILITIES FOR RESEARCH**

SHIELDED AREA, fixed m<sup>2</sup>; movable 1300 m<sup>2</sup>  
 TARGET STATIONS 10 in 6 rooms  
 STATIONS served at same time, max 1  
 MAG SPECTROGRAPH, type S800 and Enge splitpole  
 COMPUTER model VAX 780 & 750's

OTHER FACILITIES Reaction Product Mass Separator,  
 Multi-detector array, 120" scattering chamber,  
 60" scattering chamber.

**CHARACTERISTIC BEAMS**

PARTICLE	ENERGY (MeV)		CURRENT (pμA)	
	Goal	Achieved	Internal	External
12C	2,400			
40Ca	8,000			
238U	4,800			

**SECONDARY**

(part/s)

**BEAM PROPERTIES**

MEASURED	CONDITIONS	
	RF deg	μA of MeV ions
PULSE WIDTH	RF deg	μA of MeV ions
PHASE EXC, max	RF deg	μA of MeV ions
EXTRACT eff	%	μA of MeV ions
RESOL ΔE/E	%	μA of MeV ions
EMITTANCE	(π mm. mrad) { axial } { rad }	μA of MeV ions

**OPERATING PROGRAMS**, time distribution

BASIC NUCLEAR PHYSICS .. SOLID STATES PHYSICS ..  
 BIOMEDICAL APPLICAT. .... ISOTOPE PRODUCTIONS ..

**REFERENCES/NOTES**

IEEE Trans on Nuc. Sci. NS-26 (1979) 2078  
 MSU Reports MSUCP 29 (June 1980) & MSUCP 35 (June 1981)

**PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS**

Major components of K800 are on order and scheduled for delivery in fall 1981 (magnet iron, coil bobbin, coil conductor, helium refrigerator, anode power supply, and trim coil power supplies). The building addition for the cyclotron is complete; the addition for experimental areas is scheduled to be complete in April 1982.