

ENTRY NO. C68 Date July 1992  
 Name of Machine K1200 (formerly K800)  
 Institution MICHIGAN STATE UNIVERSITY  
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 In Charge: C.K. GELBEKE Reported by: P. MILLER

**HISTORY**

MILESTONE DATES:  
 Design 76-86 Model Tests .....  
 Construction 80-87 First Beam 6/88  
 DESIGN/CONSTRUCTION BY:  
 in house ..... other .....  
 COST: Accelerator 7,500,000 Facility 35,000,000  
 FUNDED BY: DOE(1980-82), NSF(1983-present)

**STATUS**

STAFF: Machine  
 Scientists ..... Engineers .....  
 Technicians ..... Students .....  
 Research (in house/external)  
 Scientists ..... / ..... Engineers ..... / .....  
 Technicians ..... / ..... Students ..... / .....  
 BUDGET: Machine ..... Funded by .....  
 Research ..... Funded by .....  
 TIME DISTRIBUTION:  
 Basic Research (in house/external) ..... % / ..... %  
 Applied Program (in house/external) ..... % / ..... %  
 Development ..... % Maintenance ..... %

**MAGNET**

POLE PARAMETERS:  
 Diameter 219.7 cm R<sub>extract</sub> 103 cm R<sub>inject</sub> 1 cm  
 HILL PARAMETERS: Gap (min) 7.6 cm B<sub>max</sub> 6.2 T  
 (@ 7.2x10<sup>9</sup> AT) Gap (max) 91.4 cm B<sub>min</sub> 4.5 T  
 VALLEY PARAMETERS: Gap (min) ..... cm B<sub>max</sub> ..... T  
 (@ ..... AT) Gap (max) ..... cm B<sub>min</sub> ..... T  
 AVERAGE FIELD: < B ><sub>min</sub> 3.0 T < B ><sub>max</sub> 5.3 T  
 NUMBER OF SECTORS: compact/separated 3 / .....  
 sector angle ..... deg. spiral (max) 176 deg.  
 FIELD TRIMMING: Trim Coils (21x3)+1  
 Harmonic Coils (2x3)  
 Other .....  
 CURRENT: Main Coils 900 Amps Stability 1/105  
 Trim Coils 400 Amps Stability 6/104  
 Stored Energy (cryogenic) 60 MJ  
 WEIGHT: Iron 265 US ton Conductor 22 US ton  
 ION ENERGY: Bending Limit E/A = 1200 q<sup>2</sup>/A<sup>2</sup> MeV/u  
 Focussing Limit E/A = 400 q/A MeV/u

**ACCELERATION SYSTEM**

FUNDAMENTAL ACCELERATION:  
 Description: 3 half wavelength cavities, 120° phasing  
 No. of Gaps/turn 6 dE/dn(max) 0.48 MeV/q  
 Voltage(max) 0.160 MV Harmonic f<sub>rf</sub>/f<sub>ion</sub> 1  
 Freq 9-27 MHz Power in(max) 0.92 MW  
 Stability: Phase Voltage 1/10<sup>4</sup>  
 OTHER CAVITIES (Flattopping or otherwise):  
 Description: .....  
 Region of Influence: R<sub>min</sub> ..... cm R<sub>max</sub> ..... cm  
 No. of Gaps/turn ..... dE/dn(max) ..... MeV/q  
 Voltage(max) ..... MV Harmonic f<sub>rf</sub>/f<sub>ion</sub> .....  
 Freq ..... MHz Power in(max) ..... MW  
 Stability: Phase Voltage .....

**VACUUM SYSTEM**

OPERATING PRESSURE: 1x10<sup>-6</sup> Torr  
 PUMPS: No. and type 2 cryopanel, 7K, Cu  
 2500 l/s/panel, 3 turbomolecular pumps

**ION SOURCE(S)**

Type	Intensity (mA)	Q	$\epsilon_n = \beta\gamma\epsilon$ (mm mrad)	Ion Species
(a) RTECR	1.0		0.1-0.2	all
(b) CPECR	1.0		0.1-0.2	alkali metals
(c) SCECR	3.0		0.1-0.3	all
(d)				

**INJECTION SYSTEM**

Buncher, spiral inflector Efficiency 10 %

**EXTRACTION SYSTEM**

Precessional, 2 elec. defl. Efficiency 50 %

**CHARACTERISTIC BEAMS**

Accelerated Ions	E/A (MeV/u)	Current(part $\mu$ A)	
		Internal	External
(a) <sup>4</sup> He <sup>2+</sup>	155		3.8x10 <sup>-3</sup>
(b) <sup>20</sup> Ne <sup>9+</sup>	125	1.3x10 <sup>-3</sup>	0.7x10 <sup>-3</sup>
(c) <sup>129</sup> Xe <sup>31+</sup>	65		0.5x10 <sup>-6</sup>
(d) <sup>238</sup> U <sup>39+</sup>	25	3.8x10 <sup>-6</sup>	0.44x10 <sup>-6</sup>
Secondary Particles		E (MeV)	part/sec
(a) <sup>11</sup> Li		700	2500
(b) <sup>20</sup> Ne		1300	3.5
(c) <sup>40</sup> Ca		2200	1.6x10 <sup>6</sup>

**EXTRACTED BEAM PROPERTIES:**

For 0.5x10<sup>-3</sup>  $\mu$ A of <sup>40</sup>Ar<sup>13+</sup> ions  
 $\Delta E/E$  ..... %  $\Delta\phi$  ..... °rf  
 $\epsilon_n = \beta\gamma\epsilon$  x ..... 2 .....  $\pi$ mm mrad z ..... 3 .....  $\pi$ mm mrad

**FACILITIES FOR RESEARCH**

SHIELDED AREA: Fixed ..... m<sup>2</sup> Moveable 1300 m<sup>2</sup>  
 Target Stations: 6 No. Served At Same Time: 1  
 MAGNETIC SPECTROMETERS: S320, S800, A1200  
 OTHER FACILITIES: 4 pi array, Miniball, Reaction  
 Product Mass Spectrometer, 92 inches  
 Scattering Chamber, 7T Solenoid

**REFERENCES/NOTES**

- (a) MSU Reports MSUCP 29 (June 80) & MSUCP 35 (June 81) ...
- (b) Proc. of 11th Int. Conf. on Cyc. (1986)157

**PLAN VIEW OF FACILITY, COMMENTS**