ENTRY NO. C67 **Date** July 1992

Name of Machine K500

Institution Michigan State University

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In Charge: C.K. GELBKE **Reported by:** P. MILLER

HISTORY

MILESTONE DATES:

Design 74-79 Model Tests 75-77

Construction 77-81 First Beam 8/82

DESIGN/CONSTRUCTION BY:

in house ... other ...

COST: Accelerator $2,900,000 Facility $3,500,000

FUNDED BY: National Science Foundation

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 142 cm $R_{extract}$ 67 cm R_{inject} 1 cm

HILL PARAMETERS: Gap (min) 6.35 cm B_{max} 5.8 T

(@ 4.681 MAT) Gap (max) 91.4 cm B_{min} 4.3 T

VALLEY PARAMETERS: Gap (min) ... cm B_{max} ... T

(@ ... AT) Gap (max) ... cm B_{min} ... T

AVERAGE FIELD: $< B >_{min}$ 3.0 T $< B >_{max}$ 4.95 T

NUMBER OF SECTORS: compact/separated 3 / ...

sector angle ... deg. spiral (max) 120 deg.

FIELD TRIMMING: Trim Coils (13x3) + 1

Harmonic Coils 2x3

Other ...

CURRENT: Main Coils 700 Amps Stability 1/105

Trim Coils 400 Amps Stability 6/104

Stored Energy (cryogenic) 18 MJ

WEIGHT: Iron 100 US ton Conductor 8 US ton

ION ENERGY: Bending Limit E/A = 520 q^2/A^2 MeV/u

Focussing Limit E/A = 160 q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:

Description: 3 half wavelength cavities, 120° phasing

No. of Gaps/turn 6 dE/dn(max) 0.51 MeV/q

Voltage(max) 0.1 MV Harmonic f_{rf}/f_{ion} 1,2

Freq 9-27 MHz Power in(max) 0.42 MW

Stability: Phase ... Voltage 1/104

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_{rf}/f_{ion} ...

Freq ... MHz Power in(max) ... MW

Stability: Phase ... Voltage ...

VACUUM SYSTEM

OPERATING PRESSURE: 3×10^{-6} Torr

PUMPS: No. and type 2 cryopanels, 7K, charcoal, 3 turbomolecular pumps

ION SOURCE(S)

	Type	Intensity (mA)	@	$\epsilon_n = \beta\gamma\epsilon$ (πmm 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 μA) Internal	External
(a)	$^{4}He^{2+}$	54	1	.05
(b)	$^{14}N^{6+}$	50	.01	.007
(c)	$^{40}Ar^{12+}$	35	.004	.0002
(d)	$^{86}Kr^{19+}$	20	.00026	.0001

	Secondary Particles	E (MeV)	part/sec
(a)			
(b)			
(c)			

EXTRACTED BEAM PROPERTIES:

For ... μA of ... MeV/u ... ions

$\Delta E/E$ ... % $\Delta\phi$ ... °rf

$\epsilon_n = \beta\gamma\epsilon$ x ... πmm mrad z ... πmm mrad

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed ... m^2 Moveable 1300 m^2

Target Stations: 6 No. Served At Same Time: 1

MAGNETIC SPECTROMETERS: S320

OTHER FACILITIES: 4 pi array, miniball, Reaction Product Mass Spectrometer, 92 inches Scattering Chamber, 7T Solenoid

REFERENCES/NOTES

(a) IEEE Trans. on Nuc. Sci. NS-26(1979)2040 3653

(b) MSU Annual Report 1974-1985

PLAN VIEW OF FACILITY, COMMENTS