ENTRY No. 110

NAME OF MACHINE K1200 (formerly K800) DATE May 1989

INSTITUTION MICHIGAN STATE UNIVERSITY

ADDRESS NSCL/CYCLOTRON LABORATORY, EAST LANSING, MICHIGAN 48824-1321 USA

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IN CHARGE S. AUSTIN REPORTED BY P. MILLER

HISTORY AND STATUS

DESIGN, date 76-86 Model tests

ENG DESIGN, date 79-86

CONSTRUCTION, date 80-87

FIRST BEAM, date (or goal) 6/88

MAJOR ALTERATIONS

COST, ACCELERATOR $7,500,000 (procurement)

COST, FACILITY total $35,000,000

FUNDED BY DOE (1980-82), NSF (1983-present)

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 1 cm

GAP, min 7.6 cm, Field 62 kG
max 91.4 cm, Field 45 kG
} at 7,200,000 Ampere turns

AVERAGE FIELD at R ext 53 kG

B max/ <B> 3

NUMBER OF SECTORS { compact 3 / separated } Spiral, max .. deg

SECTOR ANGLE (SSC) deg

TRIMMING COILS (2i x 3)+i

CONDUCTOR, material and type NbTi in Cu

STORED ENERGY (cryogenic) 60 MJ

POWER: main coils 0 max, kW ; current stability $1/10^5$

trimming coils 100 max, kW ; current stability $1/10^4$

WEIGHT: Fe 265 US tons ; coils 22 US tons

COOLING system Helium Bath

ION ENERGY (bending limit) E/A = 1200 q^2/a^2 MeV/amu

(focusing limit) E/A = 400 q^2/a^2 MeV/amu

ACCELERATION SYSTEM

DEES, number 3 ; angle 53 deg

BEAM APERTURE cm ; DC Bias kV

TUNED by, coarse sliding short fine capacitive plate

RF 9 to 27.5 mHz, stable ± $1/10^7$/day

Orb F 4.5 to 27.5 mHz

HARMONICS, RF/Orb F, used 1 2

DEE - Gnd, max 200 kV, min gap cm

STABILITY, (pk-pk noise)/(pk RF volt) $1/10^4$

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 $1x10^{-6}$ Torr

PUMPS, No, Type, Size 3 cryopanels, 4.5K, Cu, 2500 lts/second/panel

3 turbo molecular pumps

ION SOURCES

ECR (2+ supercond. under const.), beam switchyard.

AXIAL

INJECTION SYSTEM

BUNCHER AND SPIRAL DC INFLECTOR

EXTRACTION SYSTEM

PRECESSIONAL & 2 ELECT. DEFLEC. & IRON CHANNELS

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed m² ; movable 1300 m²

TARGET STATIONS 6 in 6 rooms

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type S320, S800

COMPUTER model Vax 750's, 8530, microVax workstations

OTHER FACILITIES Reaction Product Mass Separator, 4 pi array, 92" scattering chamber

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
$^{14}N^{5+}$		1050	.0018	.0008
$^{40}Ar^{14+}$		3400	$.5 \times 10^{-6}$	3.5×10^{-6}
$^{129}Xe^{23+}$		4000		25×10^{-6}
^{238}U	4800			
SECONDARY				(part/s)

BEAM PROPERTIES

MEASURED	CONDITIONS
PULSE WIDTH ..... RF deg	..... pμ A of .... MeV ... ions
PHASE EXC, max ... RF deg	..... pμ A of .... MeV ... ions
EXTRACT eff ..... %	..... pμ A of .... MeV ... ions
RESOL ΔE/E ..... %	..... pμ A of .... MeV ... ions

EMITTANCE

(π mm. mrad) { ... axial / ... rad } ..... pμA of ..... MeV ... ions

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 90% SOLID STATES PHYSICS ....

BIOMEDICAL APPLICAT. .... ISOTOPE PRODUCTIONS ....

FACILITY DEVELOPMENT 10%

REFERENCES/NOTES

1) IEEE Trans. on Nuc. Sci. NS-26 (1979) 2078.

2) MSU Reports MSUCP 29 (June 1980) & MSUCP 35 (June 1981).

3) Proceedings of 11th Int. Conf. on Cyc. (1986) 157.

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, COMMENTS