ENTRY NO. C65 Date October 2, 1995

Name of Machine Texas A&M K500 Cyclotron

Institution Texas A&M University

Address College Station, Texas USA 77843-3366

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In Charge: J. B. Natowitz Reported by: D. P. May/R. C. Rogers

HISTORY

MILESTONE DATES:

Design 1980 Model Tests

Construction 1982-1988 First Beam June 15, 1988

DESIGN/CONSTRUCTION BY:

in house 80% other 20%

COST: Accelerator $8,500,000 Facility $36,000,000

FUNDED BY: Texas A&M University Welch Foundation

STATUS

STAFF: Machine

Scientists 3 Engineers 5

Technicians 20 Students

Research (in house/external)

Scientists 20 / Engineers /

Technicians 5 / Students 34 /

BUDGET: Machine $2,000,000 Funded by State of Texas, DOE

Research $1,500,000 Funded by DOE, Welch, NSF

TIME DISTRIBUTION:

Basic Research (in house/external) 90 % / 10 %

Applied Program (in house/external) % / %

Maintenance 25 % Development 14 %

MAGNET

POLE PARAMETERS:

Diameter 142 cm $R_{extract}$ 67 cm R_{inject} 0.8 cm

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

(@ $4.7X10^6$ AT) Gap (max) -- cm B_{min} -- T

VALLEY PARAMETERS: Gap (min) 91.4 cm B_{max} 4.3 T

(@ $4.7X10^6$ AT) Gap (max) -- cm B_{min} -- T

AVERAGE FIELD: $<B>_{min}$ T $<B>_{max}$ 4.9 T

NUMBER OF SECTORS: compact/separated 3 /

sector angle 60° deg. spiral (max) 113.5 deg.

FIELD TRIMMING: Trim Coils 13

Harmonic Coils 2

Other

CURRENT: Main Coils 800 Amps Stability $2X10^{-5}$

Trim Coils 400 Amps Stability $1X10^{-4}$

Stored Energy (cryogenic) 22 MJ

WEIGHT: Iron 100 Conductor NbTi in Cu

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

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

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:

Description: 3, 53° DEES

No. of Gaps/turn 6 dE/dn(max) 0.24 MeV/q

Voltage (max) 0.08 MV Harmonic f_{rf}/f_{ion} 1,2

Freq 9-28 MHz Power in(max) 0.24 MW

Stability: Phase < 0.1° Voltage 10^{-4}

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: $6X10^{-8}$ to $2X10^{-7}$ Torr

PUMPS: (No. and type) 3 turbomolecular, 3 cryopanel

ION SOURCE(S)

	Type	Intensity (mA)	@ $\varepsilon_n = \beta\gamma\varepsilon$ (π mm mrad)	Ion Species
(a)	Ext RT ECR	.027		$16_0 7+$
(b)		.019		$40_{Ar} 12+$
(c)		.005		$58_{Ni} 17+$
(d)		.004		$84_{Kr} 20+$

INJECTION SYSTEM

Axial, Buncher, Spiral, Inflector Efficiency 4-20 %

EXTRACTION SYSTEM

Electrostatic + Magnetic Efficiency 15-50 %

CHARACTERISTIC BEAMS

	Accelerated Ions	E/A (MeV/u)	Current (part μA) Internal	External
(a)	D^+	65	0.06	0.015
(b)	$12_C 5+$	50	0.012	0.003
(c)	$40_{Ar} 14+$	40	0.0005	0.00025
(d)	$181_{Ta} 24+$	6	0.004	0.001

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

EXTRACTED BEAM PROPERTIES:

For μA of MeV/u ions

$\Delta E/E$ % $\Delta\phi$ °rf

$\varepsilon_n = \beta\gamma\varepsilon$ x π mm mrad z π mm mrad

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed: 720 m^2 Moveable m^2

Target Stations: 8 No. Served At Same Time: 1

MAGNETIC SPECTROMETERS: 3

OTHER FACILITIES: Neutron Ball, 4Π Charged Particle Detector (HILI + CsI Ball), BaF_2 Array, Beam Analysis System, $\Delta E/E$ = 1/2500, Radiation Effects Test Facility

REFERENCES/NOTES

(a)

(b)

PLAN VIEW OF FACILITY, COMMENTS