ENTRY NO. C8 **Date** Sep. 20, 1995

Name of Machine HIRFL Separated Sector Cyclotron (Main Accelerator)

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In Charge: H. W. Wei **Reported by:** F. Ye

HISTORY

MILESTONE DATES:
Design 1976 Model Tests 1976
Construction 1978 First Beam Dec. 12, 1988

DESIGN / CONSTRUCTION BY:
in house yes other engineering contracts

COST: Accelerator 100M yuans Facility 140M yuans

FUNDED BY: State Planning Commission, CAS

STATUS

STAFF: Machine
Scientists 40 Engineers 40
Technicians 50 Students 15
Research (in house/external)
Scientists / Engineers /
Technicians / Students /

BUDGET: Machine 10Myuans Funded by SPC
Research 3Myuans Funded by NSFC, CAS

TIME DISTRIBUTION:
Basic Research (in house/external) 40 % / 15 %
Applied Program (in house/external) 10 % / 10 %
Maintenance 15 % Development 10 %

MAGNET

POLE PARAMETERS:
Diameter 717 cm $R_{extract}$ 321 cm $R_{inject.}$ 100 cm

HILL PARAMETERS: Gap (min) 10 cm B_{max} 1.6 T
(@ AT) Gap (max) 10 cm B_{min} 0.6 T

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

AVERAGE FIELD: $<B>_{min}$ 0.35 T $<B>_{max}$ 0.92 T

NUMBER OF SECTORS: compact/separated / 4
sector angle 52 deg. spiral (max) deg.

FIELD TRIMMING: Trim Coils 36
Harmonic Coils
Other

CURRENT: Main Coils 4000 Amps Stability 5 e-5
Trim Coils 300 Amps Stability 5 e-5
Stored Energy (cryogenic) MJ

WEIGHT: Iron 2000 tons Conductor 15.6 tons

ION ENERGY: Bending Limit E/A = 450 q^2/A^2 MeV/u
Focusing Limit E/A = q/A MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:
Description: 1/2 lambda / 2 resonators
No. of Gaps/turn 4 dE/dn(max) 1.0 MeV/q
Voltage (max) 250 MV Harmonic f_{rf}/f_{ion} 2, 4, 6
Freq 6.5 - 14 MHz Power in(max) 0.24 MW
Stability: Phase 1° Voltage 10^{-3}

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: 10^{-5} Pa

PUMPS: (No. and type) 4 HIRFL 800 Cryopumps with rough pumping system

ION SOURCE(S)

	Type	Intensity (mA)	@ $\varepsilon_n = \beta\gamma\varepsilon$ (π mm mrad)	Ion Species
(a)	ECR	0.02 - 0.3	200	C - Ta
(b)				
(c)				
(d)				

INJECTION SYSTEM

bending magnets + magnetic channels + deflector Efficiency 50 %

EXTRACTION SYSTEM

bump+deflector+magnetic channels +bending magnets Efficiency 50 %

CHARACTERISTIC BEAMS

	Accelerated Ions	E/A (MeV/u)	Current (part μA) Internal	External
(a)	C^{6+}	50		0.4
(b)	O^{8+}, Ar^{15+}	50		0.25
(c)		25		0.16
(d)	Xe^{25+} 129	8		0.01

	Secondary Particles	E (MeV)	part/sec
(a)	^{17}N, ^{9}C	55MeV/u	$1.5\ 10^{2}$
(b)		40 MeV/u	190
(c)	Li	55MeV/u	600

EXTRACTED BEAM PROPERTIES:
For 0.4 μA of 50 MeV/u C^{6+} ions
$\Delta E/E$ 0.3 % $\Delta\phi$ °rf
$\varepsilon_n = \beta\gamma\varepsilon$ x 7 π mm mrad z 7 π mm mrad

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed: 1456 m^2 Moveable m^2
Target Stations: 8 No. Served At Same Time:
MAGNETIC SPECTROMETERS:
OTHER FACILITIES: Isotope Separator, In-beam γ-ray Measuring Device, Heavy Ion Telescope, Ionization Chamber, Scattering Chamber, Fast Chemistry Separation Apparatus, Material Science Terminal, Atomic Physics Terminal

REFERENCES/NOTES

(a)
(b)

PLAN VIEW OF FACILITY, COMMENTS