

ENTRY NO. C10 Date 1995.10
 Name of Machine SINR Minicyclotron (SMCAMS)
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HISTORY

MILESTONE DATES:

Design 1986-88 Model Tests
 Construction 1989-92 First Beam 1993.3

DESIGN/CONSTRUCTION BY:

in house other

COST: Accelerator 2 Million Yuan Facility

FUNDED BY: Academia Sinica and NSFC

ION SOURCE(S)

Type	Intensity (mA)	@ $\epsilon_n = \beta\gamma\epsilon$ (π mm mrad)	Ion Species
(a)			^{12}C , ^{13}C , ^{14}C
(b) Cs sputter	0.1	0.2	
(c)			
(d)			

INJECTION SYSTEM

Two spherical electrostatic deflectors Efficiency 60 %

EXTRACTION SYSTEM

One cylindrical electrostatic deflector Efficiency 50 %

CHARACTERISTIC BEAMS

Accelerated Ions	E/A (MeV/u)	Current (part μA)	Internal	External
(a) ^{13}C	4.8×10^{-3}	1	0.5	
(b) ^{14}C	4.1×10^{-3}	0.01	0.005	
(c) ^{12}C	3.6×10^{-3}			5 counts/s
(d)				

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

EXTRACTED BEAM PROPERTIES:

For μA of MeV/u ions
 $\Delta E/E$ % $\Delta\phi$ °
 $\epsilon_n = \beta\gamma\epsilon$ x π mm mrad z π mm mrad

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed: 60 m² Moveable m²
 Target Stations: No. Served At Same Time:
 MAGNETIC SPECTROMETERS:
 OTHER FACILITIES: a measuring deflector
 a clearing deflector
 a dynode-micro channel plate detector

REFERENCES/NOTES

(a) Nucl. Instr. & Meth. B92(1994)213
 (b) Nucl. Instr. & Meth. A297(1990)47

PLAN VIEW OF FACILITY, COMMENTS

- Used as an Accelerator Mass Spectrometer (AMS) specially for radiocarbon analysis.
- Using triangular wave accelerating voltage under high harmonic operation to accelerate negative heavy ions.
- The nickel-coated yoke of the magnet constitutes the vacuum chamber without having a separate one.
- Total power consumption is 12 KW.

STATUS

STAFF: Machine

Scientists 4 Engineers 2
 Technicians 1 Students 1

Research (in house/external)

Scientists / Engineers /

Technicians / Students /

BUDGET: Machine Funded by Academia Sinica

Research Funded by NSFC

TIME DISTRIBUTION:

Basic Research (in house/external) % / %

Applied Program (in house/external) % / %

Maintenance 10 % Development 90 %

MAGNET

POLE PARAMETERS:

Diameter 113 cm R_{extract} 49.0 cm R_{inject} 25.5 cm

HILL PARAMETERS: Gap (min) 2.5 cm B_{max} 0.37 T

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

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

(@ AT) Gap (max) 31.6 cm B_{min} 0.04 T

AVERAGE FIELD: $\langle B \rangle_{\text{min}}$ 0.24 T $\langle B \rangle_{\text{max}}$ T

NUMBER OF SECTORS: compact/separated 4 /

sector angle 52 deg. spiral (max) 0 deg.

FIELD TRIMMING: Trim Coils 0

Harmonic Coils 0

Other

CURRENT: Main Coils 70 Amps Stability ± 2 ppm

Trim Coils Amps Stability

Stored Energy (cryogenic) MJ

WEIGHT: Iron 4.5 tons Conductor 3

ION ENERGY: Bending Limit E/A = 4.8×10^{-3} q²/A² MeV/u

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

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:

Description: asymmetric differential electrode

No. of Gaps/turn 4 $dE/dn(\text{max})$ 4×10^{-4} MeV/q

Voltage (max) 5×10 MV Harmonic f_r/f_{ion} 16

Freq 4.8 MHz Power in(max) MW

Stability: Phase Voltage

OTHER CAVITIES (Flattopping or otherwise):

Description: auxiliary electrode

Region of Influence: R_{min} 45 cm R_{max} 53 cm

No. of Gaps/turn 4 $dE/dn(\text{max})$ 1.4×10 MeV/q

Voltage (max) 5×10 MV Harmonic f_r/f_{ion} 16

Freq 4.8 MHz Power in(max) MW

Stability: Phase Voltage

VACUUM SYSTEM

OPERATING PRESSURE: 5×10^{-7} Torr

PUMPS: (No. and type) 1 cryopump

3 turbomolecular pumps