

ENTRY NO. C7 Date Sep. 20, 1995  
 Name of Machine HIRFL Sector Focusing Cyclotron (Injector)  
 Institution Institute of Modern Physics, Chinese Academy of Sciences (IMP)  
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**HISTORY**  
**MILESTONE DATES:**  
 Design Model Tests  
 Construction First Beam  
**DESIGN/CONSTRUCTION BY:**  
 in house other  
**COST:** Accelerator Facility  
**FUNDED BY:**

**STATUS**  
**STAFF:** Machine  
 Scientists 10 Engineers 10  
 Technicians 10 Students 3  
 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) % / %  
 Maintenance % Development %

**MAGNET**  
**POLE PARAMETERS:**  
 Diameter 170 cm  $R_{\text{extract}}$  75 cm  $R_{\text{inject}}$  4.5 cm  
**HILL PARAMETERS:** Gap (min) 1.9 cm  $B_{\text{max}}$  2.0 T  
 (@ AT) Gap (max) cm  $B_{\text{min}}$  T  
**VALLEY PARAMETERS:** Gap (min) 31.6 cm  $B_{\text{max}}$  1.2 T  
 (@ AT) Gap (max) cm  $B_{\text{min}}$  T  
**AVERAGE FIELD:**  $\langle B \rangle_{\text{min}}$  0.8 T  $\langle B \rangle_{\text{max}}$  1.6 T  
**NUMBER OF SECTORS:** compact/separated 3 /  
 sector angle deg. spiral (max) 33 deg.  
**FIELD TRIMMING:** Trim Coils 12  
 Harmonic Coils 4 X 3  
 Other  
**CURRENT:** Main Coils 1300 Amps Stability  $1 \times 10^{-5}$   
 Trim Coils 500 Amps Stability  $1 \times 10^{-4}$   
 Stored Energy (cryogenic) MJ  
**WEIGHT:** Iron 220 tons Conductor 16 tons  
**ION ENERGY:** Bending Limit  $E/A = 69 \text{ q}^2/A^2 \text{ MeV/u}$   
 Focusing Limit  $E/A = \text{q/A MeV/u}$

**ACCELERATION SYSTEM**  
**FUNDAMENTAL ACCELERATION:**  
 Description:  $1/2 \lambda_{\text{resonator}}$   
 No. of Gaps/turn 2  $dE/dn(\text{max})$  0.2 MeV/q  
 Voltage (max) 100 MV Harmonic  $f_H/f_{\text{ion}}$  1.3  
 Freq 6.18 MHz Power in(max) 0.2 MW  
 Stability: Phase 1 Voltage  $10^{-3}$   
**OTHER CAVITIES (Flattopping or otherwise):**  
 Description:  
 Region of Influence:  $R_{\text{min}}$  cm  $R_{\text{max}}$  cm  
 No. of Gaps/turn  $dE/dn(\text{max})$  MeV/q  
 Voltage (max) MV Harmonic  $f_H/f_{\text{ion}}$   
 Freq MHz Power in(max) MW  
 Stability: Phase Voltage

**VACUUM SYSTEM**  
**OPERATING PRESSURE:**  $5 \times 10^{-5} \text{ Pa}$   
**PUMPS:** (No. and type) 2 HIRFL 800 cryopumps,  
 2 turbo-pumps, rough pumping system

**ION SOURCE(S)**

| Type    | Intensity (mA) | @ $\epsilon_n = \beta \gamma \epsilon$ ( $\pi \text{ mm mrad}$ ) | Ion Species |
|---------|----------------|------------------------------------------------------------------|-------------|
| (a) ECR | 0.02 - 0.3     | 200                                                              | c - Ta      |
| (b)     |                |                                                                  |             |
| (c)     |                |                                                                  |             |
| (d)     |                |                                                                  |             |

**INJECTION SYSTEM**  
 spiral electrostatic inflector Efficiency 30 %  
**EXTRACTION SYSTEM**  
 electrostatic deflectors + magnetic channel Efficiency 70 %

**CHARACTERISTIC BEAMS**

| Accelerated Ions     | E/A (MeV/u) | Current (part $\mu\text{A}$ ) |          |
|----------------------|-------------|-------------------------------|----------|
|                      |             | Internal                      | External |
| (a) $\text{C}^{4+}$  | 4.5         | 5                             | 5        |
| (b) $\text{O}^{6+}$  | 4.5         | 4                             | 4        |
| (c) $\text{Ar}^{8+}$ | 2.4         | 2                             | 2        |
| (d) $\text{Xe}^{4+}$ | 0.77        | 0.1                           | 0.1      |

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

**EXTRACTED BEAM PROPERTIES:**  
 For  $\mu\text{A}$  of MeV/u ions  
 $\Delta E/E$  %  $\Delta \phi$  °rf  
 $\epsilon_n = \beta \gamma \epsilon$   $\pi \text{ mm mrad}$  z  $\pi \text{ mm mrad}$

**FACILITIES FOR RESEARCH**  
**SHIELDED AREA:** Fixed:  $\text{m}^2$  Moveable  $\text{m}^2$   
 Target Stations: No. Served At Same Time:  
**MAGNETIC SPECTROMETERS:**  
**OTHER FACILITIES:**

**REFERENCES/NOTES**  
 (a)  
 (b)

#### PLAN VIEW OF FACILITY, COMMENTS

