

Entry: **C9**
 Machine Name: HIRFL - SSC
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Date: June, 1998
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HISTORY

Design by: Institute of Modern Physics
 Construction time: 1978 - 1987
 First beam: Dec.12, 1988

CHARACTERISTIC BEAMS

ions / energy (MeV/n) / current (pps) / power (W) :
 - ¹²C, ¹⁶O, ²⁰Ne / 100 / 1.3×10¹¹ / 35
 - ⁴⁰Ar / 35 / 4×10¹⁰ / 10
 - ⁸⁴Kr / 16 / 1×10¹⁰ / 2.8
 - ¹²⁹Xe / 8 / 1×10⁹ / 0.2

transmission efficiency (total)
 - typical: 0.3% - best: 0.5%
 transverse emittance (rms)
 - vertical: 8 π mmmrad
 - horizontal: 8 π mmmrad
 longitudinal emittance (rms) 0.3%×20° ΔE/E.deg RF

USES

basic research: 55% therapy:
 development: 10% isotope production:
 other applications: 15% maintenance: 10%
 beam tuning: 10%
 total time: 4500 h/year

TECHNICAL DATA

a) magnet
 type: Separated Sectors
 Kb: 450 MeV/A Kf: MeV/A
 average field (min-max): 0.35-0.92 T
 number of magnet sectors: 4
 - angle: 52 deg
 - spiral (max): deg
 pole parameters
 - diameter: 7.17 m
 - injection radius: 1.0 m
 - extraction radius: 3.21 m
 hill gap: 0.1 m valley gap: m
 field trimming
 - trim coils
 - number: 25
 - current (max): 300 A
 - harmonic coils
 - number:
 - current (max): A
 - others
 - number: 11
 - current (max): A
 main coils:
 - number: 2×6
 - Ampere-turns: 384,000 A.T.
 - current: 4000 A
 stored energy: MJ
 weight: - iron: 2000 t - coils: 15.6 t
 power
 - main coils (total): 700 kW
 - trim coils (total max): kW
 - refrigerator (cryogenic): kW

b) RF

- acceleration
 - frequency range: 6.5-14 MHz
 - harmonic modes: 2, 4, 6
 - number of dees: 2
 - angular aperture: 30 deg
 - voltage: - average (min-max): 70-240 kV
 - variation with radius: max 25%
 - power in (max): 2*120 kW
 - stability: - phase: 0.2 deg - voltage: 0.1%

- other cavities

- purpose:
 - frequency range: MHz
 - region of influence: m
 - voltage (max): kV
 - power in (max): kW
 - stability:- phase: deg - voltage: %

c) injection

- internal source:
 - external (radial/axial): radial
 - elements: bending magnet + magnetic channels + deflector
 - source voltage: kV
 - injection energy: 0.5-8.5 MeV/n
 - buncher: two cavity bunchers

d) ion sources/injector

injector cyclotron SFC K=69
 injection efficiency: 10%

e) extraction

- elements, characteristics:
 - magnetic bump field
 - deflector
 - magnetic channels
 - bending magnets
 - efficiency
 - typical: 40% - best: 70%

f) vacuum

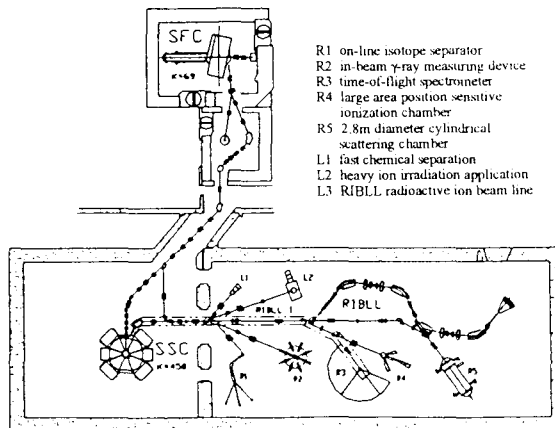
- pumps: 4 HIRFL-800 Cryopumps (20,000 l/s)
 rough pumping
 - achieved vacuum: 1×10⁻⁵ Pa

REFERENCES

EXPERIMENTAL FACILITIES

Isotope Separator, In-beam γ-ray Measuring Device, Ionization Chamber, Atomic Physics, Scattering Chamber, Fast Chemistry Separation, Material Science Terminal, Radioactive Ion Beam Line(RIBLL)

PLAN VIEW OF FACILITY



COMMENTS