

Entry: C11  
 Machine Name: SINR Minicyclotron  
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HISTORY SINR Cyclotron Laboratory  
 Design by: 1989-1992  
 Construction time: 1993.  
 First beam: 1993.

CHARACTERISTIC BEAMS  
 ions / energy (MeV/n) / current (pps) / power (W) :  
 C12 0.0048 / 0.5(µa)  
 C13 0.0041 / 0.02(µa)  
 C14 0.0036 / 15(pps)

transmission efficiency (total)  
 - typical: 7% - best: 10%  
 transverse emittance (rms)  
 - vertical: π mmurad  
 - horizontal: π mmurad  
 longitudinal emittance (rms) ΔE/E.deg RF

USES  
 basic research: 90% therapy: %  
 development: % isotope production: %  
 other applications: % maintenance: 10%  
 beam tuning: %  
 total time: 1500 h/year

TECHNICAL DATA  
 a) magnet Radial Sector  
 type: 0.0048 MeV/A Kf: 0.23 MeV/A  
 average field (min-max): 4 T  
 number of magnet sectors: 52 deg  
 - angle: 52 deg  
 - spiral (max): deg  
 pole parameters  
 - diameter: 1.13 m  
 - injection radius: 0.25 m  
 - extraction radius: 0.49 m  
 hill gap: 0.025 m valley gap: 0.316 m  
 field trimming  
 - trim coils  
 - number: .....  
 - current (max): ..... A  
 - harmonic coils  
 - number: .....  
 - current (max): ..... A  
 - others  
 - number: .....  
 - current (max): ..... A  
 main coils: 1 pair  
 - number: .....  
 - Ampere-turns: 6720 A.T.  
 - current: 60 (+/- 2ppm) A  
 stored energy: ..... MJ  
 weight : - iron: 4.5 t - coils: ..... t  
 power  
 - main coils (total): 2 kW  
 - trim coils (total max): kW  
 - refrigerator (cryogenic): kW

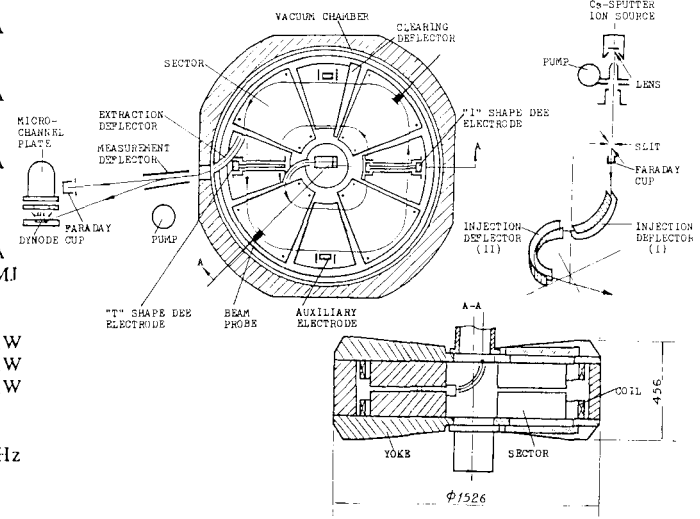
b) RF  
 - acceleration  
 - frequency range: 4.13-4.82 MHz  
 - harmonic modes: 16  
 - number of dees: 2  
 - angular aperture: 7 deg  
 - voltage: average (min-max): 0.5 kV  
 - variation with radius: .....  
 - power in (max): 1 kW  
 - stability: - phase: deg - voltage: %

- other cavities increasing turn spacing  
 - purpose: 4.13-4.82 MHz  
 - frequency range: 0.02 m  
 - region of influence: 0.5 kV  
 - voltage (max): 0.5 kW  
 - power in (max): deg - voltage: %  
 - stability: phase: deg - voltage: %  
 c) injection  
 - internal source: .....  
 - external (radial/axial): axial  
 - elements: single lens, steering  
 two spherical electrostatic def.  
 - source voltage: 0.0015 kV  
 - injection energy: 0.0015 MeV/n  
 - buncher: .....  
 - injection efficiency: 20 %  
 d) ion sources/injector

Cesium sputter negative ion source  
 e) extraction  
 - elements, characteristics:  
 One cylindrical elec. def.  
 Two auxiliary electrodes  
 One measuring deflector  
 Two sets of quadrupoles  
 - efficiency  
 - typical: 50% - best: 75%  
 f) vacuum two turbomolecular pumps  
 - pumps: two cryopumps  
 - achieved vacuum: 3 x 10<sup>-5</sup> Pa

REFERENCES  
 1. Proc. 14th Int. Cof. on Cycl. (1995)107  
 2. N.I.M. A297(90)47; A278(89)409  
 EXPERIMENTAL FACILITIES

PLAN VIEW VIEW OF FACILITY



Layout of the SMCAMS facility.

COMMENTS  
 The first negative heavy ion cyclotron used as AMS