18 GHz ECR Ion Source

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An 18 GHz superconducting electron cyclotron resonance ion source (SCECRIS) is under construction as a subject of the AVF upgrade project [1]. We have finished to assemble mirror coils, a sextupole magnet made of NdBFe parmanent magnets, a vacuum chamber with a water cooling channel, ion extraction electrodes, an einzel lens and an analyzing magnet. It takes 2 weeks to cool down the superconducting coils by a G-M refregirator. Coils were successfully excited by the designed maximum currents. The sextupole magnet is of the Halbac type and is composed of 24 blocks with gradually changing easy axis directions. The magnetic field at the radius of 36 mm was measured to be higher than 800 mT. Figure 1 shows azimuthal field distributions measured at the center of the magnet. Figure 2 shows the sextupole magent inserted in the mirror coil bore which is viewed from upstream. The plasma chamber has the inner radius of 39 mm and was installed in the sextupole magnet. Figure 3 shows the ECR source, the extraction chamber, the analyzing magnet and the beam line. The first operation of the source is planned early spring of 2006.

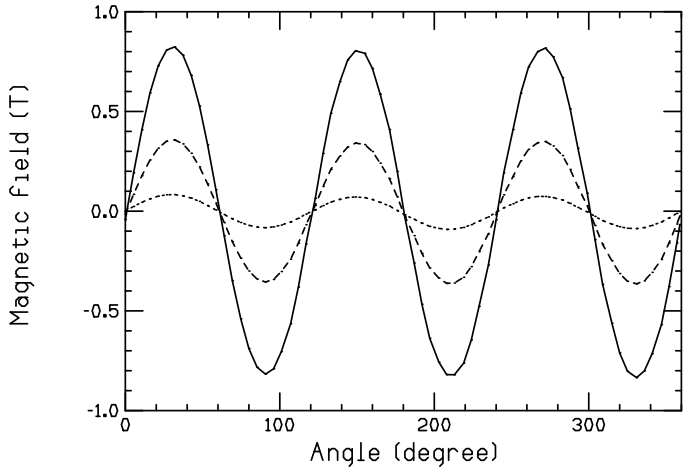

Figure 1: Field distributions measured at the center of the sextupole magnet. Soild, dashed and dotted curves show the field distributions at the rarius of 12, 24 and 36 mm, respectively.

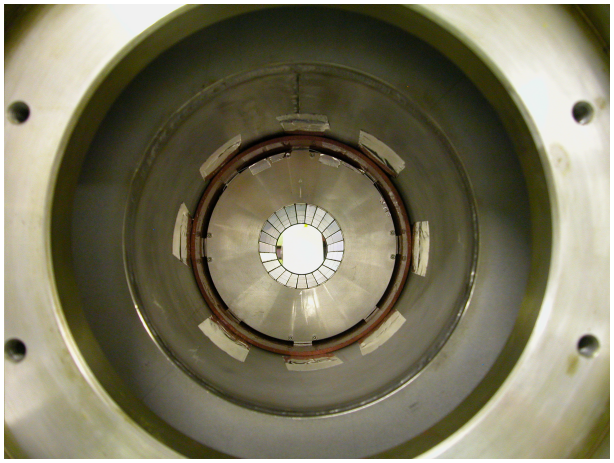

Figure 2. Sextupole magnet inserted in the bore of the superconducting solenoid.

Figure 3. 18 GHz ECR ion source and beam line.

References

[1] K. Hatanaka *et al.*, RCNP Annual Report 2004, t1.