

8 - 21 Status Report of a Compact Electromagnetic Isotope Separator at IMP

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A compact electromagnetic isotope separator (EMIS) for high purity isotope production has been developed, constructed and tested at IMP. The main part of the EMIS is a 180° separation magnet with a bending radius of 1 000 mm. To increase the dispersion and decrease the size of the separation magnet at the same time, the separator was designed with an inhomogeneous magnetic field varying proportionally to $r^{-0.51}$, which was realized with the help of the conical pole face. The highest resolution $m/\delta m$ is up to 2 000. The separation distance at the focal plane for the isotopes with the mass difference of 1% is 20 mm. The layout of the EMIS test bench and the schematic of its optics are shown in Fig. 1.

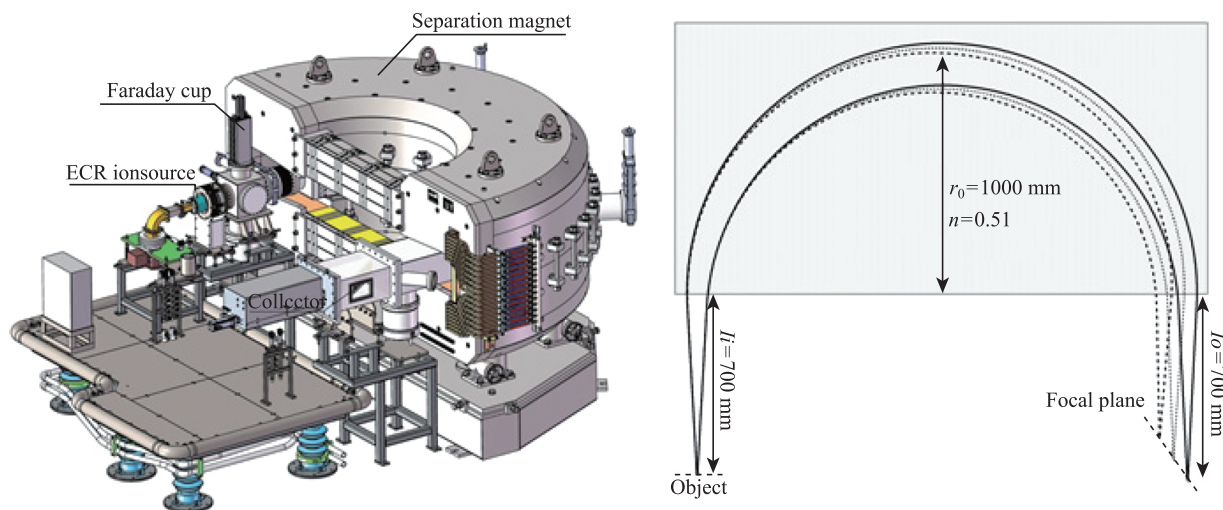


Fig. 1 (color online) The layout of the test bench for the EMIS (left) and the schematic of its optics (right).

The performance of the separator was tested by separating the Xe isotopes with the natural abundances. The obtained mass spectrum and the image of the beam spots at the collector are shown in Fig. 2. In the test, the total beam current was 15 mA, and the gas pressure in the vacuum tube of the separator was kept at 1.2×10^{-3} Pa for space charge compensation. The test results were consistent with the design.

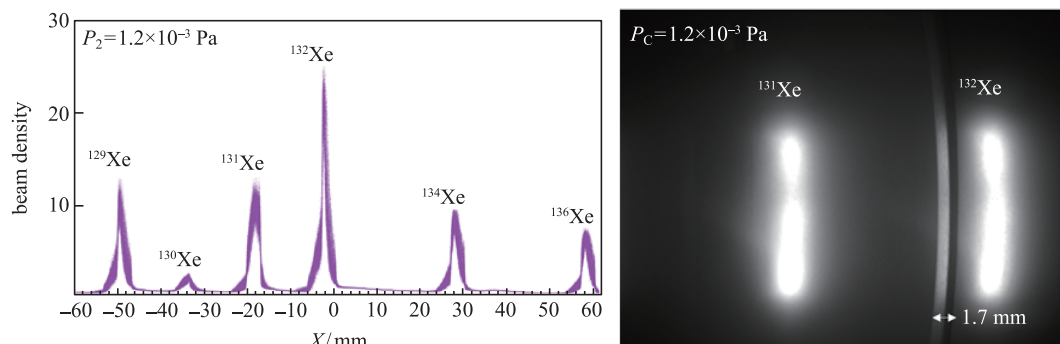


Fig. 2 (color online) The mass spectrum of Xe isotopes (left) and the image of the beam spots at the collector (right).