An All-Permanent-Magnet "Volume"-Type ECR Ion Source: Initial Performance

G.D. Alton, Y. Liu, H. Bilheux[1], F. Meyer, S. N. Murray, J. M. Cole, C. A. Reed,
G. D. Mills, C. Williams
Oak Ridge National Laboratory[*], Physics Division, P. O. Box 2008, Oak Ridge, TN 37831-6368

A compact, 6-GHz, all permanent magnet, "volume-type" ECR ion source has been initially evaluated at the Oak Ridge National Laboratory. The source has the following design characteristics: (1) large uniformly distributed, mechanically tunable, resonance plasma volume; (2) mirror ratio, B_{Max}/B_{ECR}: 2; (3) dodecapole cusp-magnet for radial plasma confinement; 4) Right-Hand-Circularly-Polarized (RHCP) traveling wave RF injection system, 5) remotely positional, three-electrode extraction system, and (6) facility for conversion into a conventional minimum-*B* magnetic field "surface" source configuration. Details of the source design, magnetic field distribution, operational parameters, ion extraction system and initial results derived from first operation of the source, including: charge-state spectra and intensity distribution within a particular charge-state are provided for selected noble gas elements. The performance of the source when operated in both "volume" and "surface" modes are also compared.

1. Ph.D. student, Universite de Versailles-Saint-Quentin, Versailles, France

---

*Oak Ridge National Laboratory, operated by UT-Battelle, LLC, for the U.S. Department of Energy under contract number DE-AC05-00OR22725.

"The submitteed manuscript has been authored by a contractor of the U.S. Government under contract No. DE-AC05-00OR22725. Accordingly, the U.S. Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or allow others to do so, for U. S. Government purposes."