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Experimental investigation of differential confinement effects in a rotating helicon plasma¹ RENAUD GUEROULT, EUGENE EVANS, STEWART J. ZWEBEN, NATHANIEL J. FISCH, Princeton Plasma Physics Laboratory, FRED LEVINTON, Nova Photonics, Inc. — Although plasmas have long been considered for isotope separation, challenges presented by nuclear waste remediation and nuclear spent fuel reprocessing have recently sparked a renewed interest for high-throughput plasma based mass separation techniques. Different filter concepts relying on rotating plasmas have been proposed to address these needs. However, one of the challenges common to these concepts is the need to control the plasma rotation profile, which is generally assumed to be provided by means of dedicated electrodes. An experimental effort aiming to evaluate the practicality of these plasma filter concepts has recently been started at PPPL. For this purpose, a linear helicon plasma source is used in combination with concentric ring electrodes. Preliminary biasing experiments results indicate floating potential profiles locally suitable for mass discrimination for different gas mixtures (Ar/Ne, Ar/N₂, Ar/Kr). Radially resolved spectroscopic measurements and neutral gas composition analysis at two different axial positions are being planned to assess the mass separation effect.

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