Abstract Submitted
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Ion dynamics in a DC magnetron microdischarge measured with laser-induced fluorescence[1] CHRISTOPHER YOUNG, NICOLAS GASCON, ANDREA LUCCA FABRIS, Stanford Plasma Physics Laboratory, TSUYOHITO ITO, Osaka University, Center for Atomic and Molecular Technologies, MARK CAPPELLI, Stanford Plasma Physics Laboratory — We present evidence of coherent rotating azimuthal wave structures in a planar DC magnetron microdischarge operated with argon and xenon. The dominant stable mode structure varies with discharge voltage, and high frame rate camera imaging of plasma emission reveals propagating azimuthal waves in the negative $\vec{E} \times \vec{B}$ direction. This negative drift direction is attributed to a local field reversal arising from strong density gradients that drive excess ions towards the anode. Observed mode transitions are shown to be consistent with models of gradient drift-wave dispersion in such a field reversal when the fluid representation includes ambipolar diffusion parallel to the magnetic field direction. Time-averaged and time-resolved laser-induced fluorescence measurements interrogate xenon ion dynamics under the action of the field reversal. Time resolution is obtained by synchronizing with the coherent azimuthal wave frequency at fixed mode number.

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