

Abstract Submitted
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Low-frequency instabilities in an ultracold neutral plasma XIANLI ZHANG, ROBERT FLETCHER, STEVEN ROLSTON, University of Maryland — We report the observation of low-frequency instabilities in an ultracold neutral plasma. By applying a small transverse magnetic field ($\sim 1\text{G}$) perpendicular to an applied electric field ($\sim 50\text{ mV/cm}$), we observed large oscillations in the emission of electrons from the expanding ultracold plasma with a frequency range from 50 to 300 KHz. We identify the electron emission as a signature of plasma instabilities due to electrons drifting relative to ions across the magnetic field. Two possible instabilities qualitatively match our observations: density-gradient drift instability due to the coupling of diamagnetic drift wave with the density gradient to the ion plasma oscillations, or a Farley-Buneman instability (two-stream) where the electrons and ions have different drift velocity. These ultracold plasma instabilities may help us understand the dynamics of ultracold neutral plasma in magnetic fields, such as Debye screening, Landau damping and magnetic confinement.

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