

Abstract Submitted  
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**Observation of a density spike in the ion distribution of an ultracold plasma** R.A. PERROTTA, K.A. TWEDT, Department of Physics and Joint Quantum Institute, University of Maryland, S.L. ROLSTON, University of Maryland - College Park — Expanding ultracold neutral plasmas are predicted to have a broad spike in the ion density distribution at the leading edge of the plasma. This feature forms as a result of a slight positive charge imbalance created by the prompt loss of electrons at plasma creation. We monitor the flux of ions passing through a grid in our vacuum chamber during the plasma expansion and the observed signal is fit well by a model of a spherical Gaussian cloud ballistically expanding through a circular planar grid. The shape of the initial flux indicates that the leading edge of the plasma has a sharp density cutoff rather than a smooth Gaussian tail. This feature is accentuated by applying a magnetic field perpendicular to the detection axis, slowing down the expansion of the neutral plasma relative to the ion spike. Supported by NSF PHY- 1004242.

Robert Perrotta  
Department of Physics and Joint Quantum Institute, University of Maryland

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