Abstract Submitted
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Ultracold Neutral Plasmas THOMAS KILLIAN, Rice University — Ultracold neutral plasmas [1], formed by photoionizing laser-cooled atoms near the ionization threshold, stretch the boundaries of traditional neutral plasma physics. The electron temperature in these plasmas is from 1-1000K and the ion temperature is around 1 K. The density can be as high as 10^{10} cm^{-3}. Fundamental interest stems from the possibility of creating strongly-coupled plasmas, but recombination, collective modes, and thermalization in these systems have also been studied. Using optical absorption imaging [2], we study expansion dynamics of the plasma during the first few tens of microseconds after photoionization. Images record the spatial extent of the system, while the Doppler broadened absorption spectrum measures the ion velocity spectrally. The expansion is driven by the pressure of the electron gas, so the ion acceleration depends on the electron temperature. Understanding expansion dynamics is important for plans to laser cool and trap the plasma. This work is supported by the National Science Foundation and David and Lucille Packard Foundation. * In collaboration with Priya Gupta, Sampad Laha, and Clayton. E. Simien. [1] T. C. Killian, S. Kulin, S. D. Bergeson, L. A. Orozco, C. Orzel, and S. L. Rolston, Phys. Rev. Lett. **83**, 4776 (1999). [2] C. E. Simien, Y.C. Chen, P. Gupta, S. Laha, Y. N. Martinez, P. G. Mickelson, S. B. Nagel, T. C. Killian, Phys. Rev. Lett. **92**, 143001 (2004).

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