

Abstract Submitted  
for the DPP10 Meeting of  
The American Physical Society

**Ion Acoustic Waves in Ultracold Neutral Plasmas** JOSE CASTRO, PATRICK MCQUILLEN, THOMAS KILLIAN, Rice University — Ultracold neutral plasmas (UNP), created by photoionization of laser-cooled atoms near ionization threshold, are orders of magnitude colder than any other neutral plasma. They have extremely clean and controllable initial conditions that enable the study of strongly coupled physics, plasma expansion and collective wave phenomena. Here, we excite ion acoustic waves in UNPs through direct imprinting of ion density modulations during plasma formation, where the density modulations are implemented by applying a mask to the ionizing laser. Laser-induced fluorescence imaging of the plasma reveals density perturbations that oscillate in space and time. In spite of the UNP's finite size, expansion, and inhomogeneous density; the dispersion relation of these oscillations matches that of ion acoustic waves.

Jose Castro  
Rice University

Date submitted: 07 Jul 2010

Electronic form version 1.4