

Abstract Submitted
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Fluorescence Spectroscopy and Self-similar Expansion Studies in Ultracold Neutral Plasmas JOSE CASTRO, HONG GAO, PRIYA GUPTA, SAMPAD LAHA, Rice University, CLAYTON SIMIEN, THOMAS KILLIAN, Rice University — Ultracold Neutral Plasmas (UNP's) are created by photoionizing laser-cooled atoms; the resulting plasma expands due to the thermal pressure of the electrons. Powerful optical diagnostics are available to study these systems where the initial density profiles, energies, and ionization states are accurately known and controllable. Fluorescence imaging of UNP's produces a spatially-resolved spectrum that is Doppler-broadened due to thermal ion velocity and shifted due to ion expansion velocity. Using this technique, measurements of the ion kinetic energy and plasma size show that the expansion is self-similar, following an analytic solution of the Vlasov equations, the central equations in the kinetic theory of plasmas.

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