

Abstract Submitted
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Temperature and Velocity Measurements Through Fluorescence and Absorption Imaging in Ultracold Neutral Plasmas JOSE CASTRO, HONG GAO, PRIYA GUPTA, SAMPAD LAHA, CLAYTON SIMIEN, THOMAS KILLIAN, Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston, TX 77005 — Imaging probes are used to characterize Ultracold Neutral Plasmas and determine quantities such as velocity and temperature of both ion and electron species. Absorption imaging studies demonstrate that electron temperature evolution varies depending on the initial electron temperature and plasma density. Absorption imaging shows Doppler broadening due to the combined effects of the radially directed expansion velocity and the random thermal motion of the ions. To distinguish these two quantities, fluorescence imaging of Ultracold Neutral Plasmas is used to produce a spatially-resolved spectrum that is Doppler-broadened due to thermal ion velocity and shifted due to ion expansion velocity. Using these two distinct imaging probes, Ultracold Neutral Plasmas were studied under different initial conditions.

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