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Laser-Induced Fluorescence Imaging of Magnetized Ultracold Neutral Plasmas[1] GRANT GORMAN, MACKENZIE WARRENS, THOMAS KILLIAN, Rice University — Ultracold neutral plasmas (UNPs), created by photoionization of a cold gas, are an excellent tool for studying strongly coupled plasmas, in which the ratio of the nearest neighbor Coulomb energy to the average thermal energy, Γ_i, is greater than one. Magnetized UNPs are of current interest because of the interplay of magnetization and strong coupling, connection to plasma confinement, and modification of recombination dynamics in strong fields; however, magnetization of UNPs also complicates the use of laser-induced-fluorescence (LIF) images of the ions to extract spatially-resolved density and temperature measurements. Here, we use combined molecular-dynamics and quantum-trajectories (MDQT) simulations to understand the impact that collisions and optical pumping has on the LIF spectra. We then use these simulations to validate an empirical model of the LIF spectra and extract spatially-resolved density and temperature measurements of the magnetized UNP.

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