Abstract Submitted
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Ionic thermalization in a mixed dual species ultracold neutral plasma[1] ROBERT SPRENKLE, Brigham Young University, LUCIANO SILVESTRI, MICHAEL MURILLO, Michigan State University, SCOTT BERGESON, Brigham Young University — We report measurements of ion temperature evolution in a dual-species ultracold neutral plasma. This plasma is created by photo-ionizing laser-cooled Yb and Ca atoms to create a plasma just inside the strong-coupling regime. As this binary mixture expands, we measure the time-evolving velocity, density, and ion temperature using laser-induced fluorescence. We determine the spatially-resolved density and temperature in a two-dimensional slice of the plasma distribution. The 4:1 mass ratio of the Yb and Ca ions gives rise to a classic two-temperature plasma near the center of the system. We measure the rate at which the central Yb and Ca ion temperatures relax over a range of different initial conditions. We find that the measured relaxation rate depends more weakly on density than theoretical models predict. This may be explained by spatial gradients in the plasma density and temperature profiles.

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