Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Progress towards energy relaxation studies in an ultracold dual-species Yb/Ca plasma[1] SCOTT BERGESON, Brigham Young University, MICHAELA KLEINERT, Willamette University — Ultracold neutral plasmas provide a unique laboratory system for studying dynamics of strongly coupled Coulomb systems. The precision spectroscopy and imaging tools of atomic physics are brought to bear on these systems of resonantly-ionized laser-cooled atoms. We have simultaneously laser-cooled and trapped Yb and Ca atoms at densities of 10^{10} cm^{-3}. The Yb and Ca atoms differ by a factor of 4 in mass. Using resonant laser excitation, we selectively ionize the two different species for the purpose of studying energy relaxation in a strongly coupled Coulomb system. The strong coupling parameter and ion mass ratio are expected to be relevant to equilibration studies in warm dense matter experiments. Sequential ionization of the two species allows the later-ionized system to abruptly perturb the first one. Adjusting the stoichiometry of the plasma allows us to carefully determine the amount of additional heat deposited into the plasma. Molecular dynamics simulations suggest that in some regimes, the energy relaxation is nearly chaotic. This talk will summarize our progress towards ultracold plasma work in this dual-species system.

[1]Supported in part by NSF (PHY-1500376) and AFOSR (FA9950-12-1-0308)

Scott Bergeson
Brigham Young University

Date submitted: 28 Jun 2016 Electronic form version 1.4