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Approach to Equilibrium in Ultracold Binary Plasma Mixtures LUCIANO SILVESTRI, Michigan State University, TUCKER SPRENKLE, SCOTT BERGESON, Brigham Young University, MICHAEL MURILLO, Michigan State University — Relaxation in non-ideal plasmas is a complex process that involves expansions/contractions, thermal conduction, thermalization and temperature equilibration. Unfortunately, very little is known experimentally about these processes because of the challenges associated with isolating them individually. As such, we rely heavily on unvalidated theoretical models. This knowledge gap is particularly large for the very challenging case of ionic relaxation. Current improvements in experimental techniques now allow for the creation of ultracold binary mixtures for the investigation of equilibrium relaxation phenomena dominated by ion-ion collisions. These experiments, when complemented by large-scale molecular dynamics (MD) simulations, promise to provide detailed data on these processes. We have modeled a binary relaxing ultracold neutral plasma with MD, motivated by experiments at BYU, and compared the results to a wide variety of theoretical models. None of the temperature relaxation rates from current theoretical models is within an order of magnitude of the MD simulations, suggesting serious gaps in our knowledge of ionic relaxation. This disagreement may be due to the strong coupling effects that are ignored or underestimated by current theoretical models.

Luciano Silvestri
Michigan State University

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