Electron-ion collision rates in strongly coupled and extremely magnetized ultracold neutral plasmas

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120 Engineering (Hammond Auditorium)

Abstract

Ultracold neutral plasmas (UNPs) ~mm scale plasmas formed from photoionizing laser cooled atoms that have electron and ion temperatures typically a few Kelvin above absolute zero (and can be even colder). They are excellent experimental platforms for measuring basic plasma properties. Their experimental parameters can be well-characterized, there are good diagnostics available, and their dynamics occur on experimentally-accessible timescales. We have conducted measurements of electron-ion collision rates in UNPs under conditions where electron strong coupling is relevant and separately as a function of electron magnetization from weak to extreme conditions. Our measurement capabilities and our experimental results will be presented, along with comparisons to theoretical predictions and how our results highlight important aspects of plasma theories.

Biography

Prof. Jacob Roberts earned his B.S. degree in Physics from the University of Notre Dame in 1994. He then went on to earn his PhD in 2001 with advisor Carl Wieman at the University of Colorado at Boulder. After spending two years as a post-doc at the National Institute of Standards and Technology in Gaithersburg, MD, he joined the faculty at CSU in 2003. His current research interests are in studying magnetized ultracold neutral plasmas and exploring light propagation in optically thick ultracold neutral atom gases.