

Abstract Submitted  
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**The quest for greater strong coupling in ultracold neutral plasmas**<sup>1</sup> MARY LYON, SCOTT BERGESON, Brigham Young University — In most physical systems, a few energy scales appear naturally. For interacting many-body systems such as ions in a plasma, electrons in a metal, or even Bose-Einstein condensates or nuclear collisions, the two most natural energy scales are the average energy per particle and the average nearest-neighbor potential energy. When the ratio of nearest-neighbor potential energy to kinetic energy is greater than 1, we say that the system is “strongly coupled.” When this happens, the system can display medium- to long-range many-body behavior that is more typical of a glass or crystal rather than a gas of atoms. In our experiments, we are working with plasmas in this exotic regime. The plasmas are created by photo-ionizing laser-cooled atoms. The ratio of energy scales in our work is about 2. Of course, we would like to see this number increase to something like 100, making our plasmas more like fluffy crystals than disordered liquids. In my talk I will describe our work and some of the things we are doing to make our plasma ions extremely cold.

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