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Minimizing the effects of disorder-induced heating through electron screening in ultracold plasmas[1] MARY LYON, SCOTT BERGESON, Brigham Young University — Strong coupling in plasmas is characterized by the ratio of the nearest-neighbor Coulomb potential energy to the average kinetic energy of the ions. In ultracold plasmas, which are produced by photoionizing laser-cooled atoms, the initial strong coupling parameter is large, due to the low initial temperature of the system. The value of the strong coupling parameter at equilibrium is limited by the relaxation of the ions due to nearest-neighbor interactions, which is called disorder-induced heating (DIH). The effects of DIH can be moderated through electron shielding. Electron screening extends the DIH time and reduces the ion equilibration temperature, thus decreasing the overall effect of DIH on the ion motion. However electron screening also softens the ion-ion interaction strength. The net result is a decrease in the strong coupling of the plasma. We report measurements of this effect due to electron screening and compare these measurements to simulations.

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