

Abstract Submitted
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Many-Body Ionization in a Frozen Rydberg Gas¹ EDWARD SHUMAN, PAUL TANNER, JIANING HAN, TOM GALLAGHER, University of Virginia — Here we present measurements of spontaneous ionization in a dense gas of 300 μK ^{85}Rb atoms of $n \sim 50$. At densities of $\sim 10^{10} \text{ cm}^{-3}$ ionization occurs on a 100 ns time scale, far too fast to be explained by the motion of the atoms or photoionization by 300 μK blackbody radiation. Rapid ionization is accompanied by spectral broadening and by the emergence of new features, which we attribute to multiple atom absorptions. We attribute the rapid ionization to a sequence of near resonant dipole-dipole transitions through virtual states in this intrinsically many-body system, culminating in the ionization of some of the atoms.

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