Strong Dissipation Inhibits Losses and Induces Correlations in Cold Molecular Gases

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Atomic quantum gases in the strong–correlation regime offer unique possibilities to explore a variety of many–body quantum phenomena. Reaching this regime has usually required both strong elastic and weak inelastic interactions, as the latter produce losses. We show that strong inelastic collisions can actually inhibit particle losses and drive a system into a strongly–correlated regime. Studying the dynamics of ultracold molecules in an optical lattice confined to one dimension, we show that the particle loss rate is reduced by a factor of 10. Adding a lattice along the one dimension increases the reduction to a factor of 2000. Our results open up the possibility to observe exotic quantum many–body phenomena with systems that suffer from strong inelastic collisions.[1]

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