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Feshbach Modulation Spectroscopy[1] JAMES FREERICKS, Georgetown Univ, ANDREAS DIRKS, Volume Graphics, HULIKAL KRISHNAMURTHY, Indian Institute of Science, KARLIS MIKELSONS, Global Science and Technology
— Feshbach resonances are often swept through to bind atoms into weakly bound molecules. Here we propose to examine the behavior of systems close to a Feshbach resonance when we modulate the bias magnetic field as a function of time, creating a modulated scattering length. On an optical lattice, this system undergoes rich physical transformations which involve both molecule formation and the hopping of molecules on the lattice and thus goes beyond a single-band Hubbard model description. While experiments have already studied some of this phenomena, especially resonance effects on the binding of molecules, we feel that this system is likely to have interesting physical behavior when on an optical lattice. We propose to probe the behavior with a harmonic modulation of the magnetic field and thus the scattering length across the Feshbach resonance as a generalization of lattice-depth modulation spectroscopy. In the regime in which the single-band Hubbard model is still valid, we provide simulation data for this type of spectroscopy which behaves somewhat differently from conventional modulation spectroscopy (the hopping is not modulated, just the interaction strength).

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