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Efimov states and upper branch dynamics in a unitary Bose-Fermi mixture[1] CHEN ZHANG, JILA, University of Colorado at Boulder and Physics department, Purdue University, CHRIS H. GREENE, Physics department, Purdue University — This work explores the spectrum of a Bose-Fermi mixture and corresponding dynamics near a broad Feshbach resonance from a few-body point of view. We show that at unitarity, heteronuclear Efimov states have universal properties in scattering from the remaining atoms in the cloud. Unlike the weak interacting limit, in unitary Bose-Fermi mixtures, there is no length scale that characterizes the interactions, owing to the diverging inter-species scattering length. Moreover, the separation of energy scales of dimer states and cluster states (trimer, tetramer and beyond) causes the effective fermionic dimer-dimer scattering to have weak non-universal behavior that is from the non-adiabtic couplings to the cluster states. This allows us to utilize the upper branches of the few-body spectrums to infer the dynamics of magneto-association of fermionic dipolar molecules at relatively high temperature and at a relatively fast time scale compared to cluster formation processes. We also compare predictions of quench dynamics from a few-body perspective to time dependent mean-field calculations.

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