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Ultracold nonreactive molecules in an optical lattice ANDRIS DOCAJ, Rice University, MICHAEL WALL, JILA, KADEN HAZZARD, Rice University — Nonreactive (NR) ultracold molecules in optical lattices are free from the two-body losses that occur in other ultracold molecules, opening up new possibilities for quantum many-body physics. Despite the absence of chemical reactions, NR molecules scatter in extremely complex ways – not captured by a delta function pseudopotential – due to the enormous number of rotational and vibrational states. We calculate the eigenstates and energies of two NR molecules confined to a single site of an optical lattice, as a first step towards deriving an effective lattice model that can describe many molecules in a lattice. To describe the short-range collisional properties, which are presently experimentally unknown, we employ random matrix theory. However, our formalism is capable of handling arbitrary short-range collisional physics.

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