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The Molecular Hubbard Hamiltonian: field regimes and molecular species M.L. WALL, E. BEKAROGLU, L.D. CARR, Colorado School of Mines — The Molecular Hubbard Hamiltonian (MHH) is a lattice many-body Hamiltonian describing the low energy physics of $^1\Sigma$ heteronuclear alkali dimers loaded into an optical lattice. We present an overview of the derivation of this Hamiltonian, focusing in particular on how its parameters may be tuned experimentally. We also present a thorough exposition of the scales of the problem down to 1Hz, which allows for truncation of long-ranged terms in the MHH to a consistent level of approximation. The most experimentally relevant species KRb, LiCs, and RbCs access very different regimes of the MHH, and so will have different many-body features. We exemplify this point with Matrix Product State (MPS) simulations of the MHH for these species in near-term experimental configurations.

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