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Quantum simulation of magnetic polarons with dipolar superlattice gases LUSHUAI CAO, XIANG GAO, XIAO-CHUN DUAN, Huazhong University of Science and Technology — We theoretically propose a strategy to simulate magnetic polarons with dipolar ultracold atoms confined in one-dimensional double-well superlattice. A spatial pseudo-spin mapping is used to induce an effective spin chain with the superlattice dipolar gas, and the defects in the effective spin chain is modelled by the holons and/or doublons in superlattice. We derived an effective Hamiltonian to describe the coupling between the defects and the effective spins, and demonstrate two types of polarons arising from the coupling between the defects and magnons, as well as from the coupling between defects and magnetic kinks. These two type of polarons exist in the weak and strong dipolar interaction regime, respectively. We also investigate the induced interaction between defects intermediated by the magnons and kinks.

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