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Tight-Binding Kondo Model and Spin-Exchange Collision Rate of Alkaline-Earth Atoms in a Mixed-Dimensional Optical Lattice REN ZHANG, Xi'an Jiaotong Univ, PENG ZHANG, Renmin University of China — We study the two-body problem of ultracold fermionic alkaline-earth (like) atoms in the electronic $^1S_0$ state (g-state) and $^3P_0$ state (e-state) which are confined in a quasi-one-dimensional (quasi-1D) tube simultaneously, where in the axial direction the g-atom experiences a 1D optical lattice and the e-atom is localized by a harmonic potential. Due to the nuclear-spin exchange interaction between the g- and e-atom, one can use such a quasi-(1+0)D system to realize the Kondo effect. We suggest two tight-binding models for this system, for the cases that the odd-wave scattering between the g- and e-atom is negligible or not, respectively. Moreover, we give a microscopic derivation for the inter-atomic interaction parameters of these models, by explicitly calculating the quasi-(1+0)D low-energy scattering amplitude of the g- and e-atom in this system and matching this exact result with the ones given by tight-binding models. We illustrate our results for the experimental systems of ultracold ^{173}Yb and ^{171}Yb atoms and show the control effect of the confinement potentials on these model parameters. Furthermore, the validity of the simple "projection approximation" is examined. In this approximation, one derives the interaction parameters

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