The quasi-1D polaron problem. When is 1D still 1D?

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Quantum simulation requires excellent knowledge of the Hamiltonian governing the behavior of the simulator. In the case of highly correlated systems, recent developments have suggested that usual models are not applicable and that efforts should be focused on the search and understanding of the effective Hamiltonians describing these systems. In this talk, I will discuss this question in the context of the study of one-dimensional systems with strongly correlated fermionic gases. In particular I will discuss how the interplay between interactions and confinement leads to emergent few body interactions that alter the properties of the system with respect to simple model Hamiltonians.