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Fermionic Cold Atom Systems in Mixed Dimensions KYLE IRWIN, SHAN-WEN TSAI, Dept. of Physics and Astronomy University of California, Riverside — Cold atom experiments can now realize mixtures of components that move in different dimensions [1]. We investigate such a system with two species of fermions. One species, \textit{f}-fermions, moves on a two-dimensional square lattice. Another species, \textit{c}-fermions, is constrained to move on a one-dimensional lattice embedded in the square lattice of \textit{f}-fermions. We investigate the effective one-dimensional system who’s interactions are mediated by the two-dimensional system, and explore effective theories, quantum phases, correlations, and relevant energy scales for various fillings of the mixed dimensional system using a functional renormalization group approach.


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