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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, f-fermions, moves on a two-dimensional square lattice. Another species, c-fermions, is constrained to move on a one-dimensional lattice embedded in the square lattice of f-fermions. We investigate the effective one-dimensional system whose 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.

[1] G. Lamporesi, J. Catani, G. Barontini, Y. Nishida, M. Inguscio, and F. Minardi, Phys. Rev. Lett. 104, 153202 (2010)

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