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Quantum phases of cold fermions in mixed dimensions: 2D layer embedded in 3D gas KYLE IRWIN, CHEN-YEN LAI, WEN-MIN HUANG, SHAN-WEN TSAI, University of California, Riverside — Recently two-species cold atoms in mixed dimensions have been realized experimentally, triggering lots of studies to explore new exotic phases in these systems. Inspired by this, we study the phase diagram of a mixed Fermi system, in which one species is confined in a two-dimensional square or triangular lattice with a correlation effect, and the other is free to move in three-dimensional space. By integrating out the free three-dimensional fermions, a long-range mediated interaction is generated in the two-dimensional lattice due to the interspecies interaction. We employ a functional renormalization group method to discover the possible phases, which may shed light to new exotic quantum phases created in ultracold atoms systems.

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