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Finite-Temperature Phase Diagrams of an Atomic Bose and Two-Component Fermi Mixture[1] HONG LING, MICHAEL FODOR, Rowan University — The recent technological advancement in cooling and trapping neutral atoms has allowed the physics of degenerate Bose-Fermi mixture, which was traditionally limited to liquid isotopes of helium atoms, to be explored in atomic quantum gases under well-controlled conditions. While existing studies have focused mainly on mixtures of single-component species, we consider in this work mixtures between single-component bosonic atoms (b) and two-component [spin-up (u) and spin-down (d)] fermionic atoms of equal densities, using a model that incorporates both repulsive collisions involving the bosonic atoms: (bb), (bu) and (bd), and attractive collision (ud) between fermionic atoms of opposite spins. We perform a systematic study of the mean-field phase diagrams at finite-temperature, including the density profiles under the local density approximation. We find that the prospect of having correlated Fermi pairs can greatly enrich the possible phases and phase separations in this system. We strive to highlight the features that are generic to the phase diagrams of such a mixture. We show how these features can be explored to facilitate the idea of using the bosonic atoms as the probe to the properties of this interacting Bose-Fermi mixture.

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