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Stability of Fulde-Ferrell-Larkin-Ovchinnikov states in ultracold atomic Fermi gases[1] JIBIAO WANG, QIJIN CHEN, Zhejiang University — The elusive Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) states have attracted enormous attention in the condensed matter and AMO communities. They have not been observed experimentally in three-dimensional (3D) Fermi gases, largely due to their predicted small region in the phase space and very low temperature required. In this talk, we will discuss the stability of the FFLO states in 3D homogeneous Fermi gases, both in equal-mass and mass imbalanced systems, within a pairing fluctuation theory. We find that the effective mass of noncondensed pairs in the directions perpendicular to the FFLO wavevector is negative, leading to instability of the FFLO states previously predicted in the literatures. Treatment beyond the T-matrix level and further symmetry breaking factors such as optical lattices and spin-orbit coupling may be necessary in order to find stable FFLO states.

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