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Anisotropic Weyl Fermions from Quasiparticle Excitation Spectrum of a 3D Fulde-Ferrell Superfluid YONG XU, RUILIN CHU, CHUANWEI ZHANG, The University of Texas at Dallas — Weyl fermions, first proposed for describing massless chiral Dirac fermions in particle physics, have not been observed yet in experiments. Recently, much effort has been devoted to explore Weyl fermions around band touching points of single particle energy dispersions in certain solid state materials (named Weyl semimetals), similar as graphene for Dirac fermions. Here we show that such Weyl semimetals also exist in the quasiparticle excitation spectrum of a three-dimensional (3D) spin-orbit coupled Fulde-Ferrell (FF) superfluid. By varying Zeeman fields, the properties of Weyl fermions, such as their creation and annihilation, number and position, as well as anisotropic linear dispersions around band touching points, can be tuned. We study the manifestation of anisotropic Weyl fermions in sound speeds of FF fermionic superfluids, which are detectable in experiments.

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