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Chiral ferromagnetism in a trapped Fermi gas with a large spin-orbit coupling SHANG-SHUN ZHANG, Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China, HAN PU, Department of Physics and Astronomy, and Rice Quantum Institute, Rice University, Houston, Texas 77251, USA, WU-MING LIU, Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China — A large spin-orbit (SO) coupling gives rise to a list of Landau level-like flat bands in a harmonic trap. In this work, we show that a chiral ferromagnetism in a trapped Fermi gas would appear on this flat bands for a weakly repulsive interaction. The competition between the ferromagnetic state with the strongly correlated state is studied. Due to the SO coupling, the spin ordering drives a corresponding orbital ordering, i.e., a chiral density current in the ferromagnetic phase. The experimental study of the these results obtained in this paper is discussed.

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