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Weyl Superfluidity in a Three-dimensional Dipolar Fermi Gas BO LIU, Department of Physics and Astronomy, University of Pittsburgh, XIAOPENG LI, Condensed Matter Theory Center and Joint Quantum Institute, University of Maryland, LAN YIN, School of Physics, Peking University, W. VINCENT LIU, Department of Physics and Astronomy, University of Pittsburgh & Wilczek Quantum Center, Zhejiang University of Technology — Weyl superconductivity or superfluidity, a fascinating topological state of matter, features novel phenomena such as emergent Weyl fermionic excitations and anomalies. Here we report that an anisotropic Weyl superfluid state can arise as a low temperature stable phase in a 3D dipolar Fermi gas. A crucial ingredient of our model is a direction-dependent two-body effective attraction generated by a rotating external field. Experimental signatures are predicted for cold gases in radio-frequency spectroscopy. The finite temperature phase diagram of this system is studied and the transition temperature of the Weyl superfluidity is found to be within the experimental scope for atomic dipolar Fermi gases. Work supported in part by U.S. ARO, AFOSR, DARPA-OLE-ARO, Charles E. Kaufman Foundation and The Pittsburgh Foundation, JQI-NSF-PFC, ARO-Atomtronics-MURI, and NSF of China.

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