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Stable non-Fermi liquid phase of itinerant spin-orbit coupled ferromagnets YASAMAN BAHRI, ANDREW POTTER, University of California, Berkeley — Direct coupling between gapless bosons and a Fermi surface results in the destruction of Landau quasiparticles and a breakdown of Fermi liquid theory. Such a non-Fermi liquid phase arises in spin-orbit coupled ferromagnets with spontaneously broken continuous symmetries due to strong coupling between rotational Goldstone modes and itinerant electrons. These systems provide an experimentally accessible context for studying non-Fermi liquid physics. Possible examples include low-density Rashba coupled electron gases, which have a natural tendency towards spontaneous ferromagnetism, or topological insulator surface states with proximity-induced ferromagnetism. Crucially, unlike the related case of a spontaneous nematic distortion of the Fermi surface, for which the non-Fermi liquid regime is expected to be masked by a superconducting dome, we show that the non-Fermi liquid phase in spin-orbit coupled ferromagnets is stable.

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