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Nearly Ferromagnetic Phases in Ultracold Fermi Gases: Simulations of ^{3} Helium KATHRYN LEVIN, CHIH-CHUN CHIEN, HAO GUO, James Franck Institute and department of physics, the University of Chicago — We outline a proposal for a future experimental program based on previous studies which purport to observe itinerant ferromagnetism in an ultracold atomic Fermi gas. Here we consider smaller positive scattering lengths (corresponding to moderately strong repulsive interactions), near to, but before the instability is surpassed. This simulation of a Hubbard gas Hamiltonian is thought to capture the physics of the classic Fermi liquid ^{3}Helium. As such, it will shed light on the long standing puzzle about whether this Fermi liquid is nearly ferromagnetic or nearly localized. Natural extensions to the polarized case are of considerable interest as simulations of polarized ^{3}Helium. We discuss how to deduce the Landau parameters, how to include trap effects and the expected nature of the collective modes. Because the ground state of ^{3}Helium is a p-wave superfluid, such studies should also be viewed as relevant to understanding how non s-wave superfluidity might be associated with Hubbard models in general.

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