

Abstract Submitted
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Magnetic instabilities in spin imbalanced ultracold Fermi gases¹

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University of Texas at Austin — We study the possibility of preparing magnetic states of spin imbalanced ultracold Fermi gases near a broad Feshbach resonance by analyzing the unstable collective magnetization modes developed when the system is placed on the BEC side. Within the approximation of momentum independent interatomic scattering, transverse magnetization instabilities appear at lower critical interaction strengths than those corresponding to the longitudinal instabilities, suggesting that the former ones are primarily responsible for driving the system into a textured state with inhomogeneous magnetization direction. The critical interaction for the onset of transverse instabilities increases with polarization. However the system already has ferromagnetic character below these interaction strengths because of a change in sign of the spin stiffness which occurs close to the Stoner transition of the corresponding unpolarized gas. We also discuss the behavior expected beyond the momentum independent scattering approximation across the resonance for, both, the superfluid and ferromagnetic instabilities present in the system and the implication of these results for experiments.

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