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Itinerant Ferromagnetism in an Atom Trap ILYA BERDNIKOV, PIERS COLEMAN, Center for Materials Theory, Rutgers University, STEVE SIMON, Bell Labs, Alcatel-Lucent — Interest in ferromagnetism has prompted the development of many theoretical techinques to study the phonomenon. However, even the most sophisticated schemes, though well motivated physically, remain intrinsically uncontrolled. This is a clear signal that more experimental input is needed, and the rapidly developing field of ultra-cold atomic gases affords just such an investigation. We propose an experiment to explore the magnetic phase transition in interacting fermionic systems, and establish signatures of ferromagnetic correlations in the observed ground states. We find, that for large trap radii ($R > 4$, in units of coherence length ξ), ground states are topological in nature, a "skyrmion" in 2D, and a "hedgehog" in 3D. Finally, we describe how to obtain the ferromagnetic phase diagram of itinerant electron systems from these experiments.

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