

Abstract Submitted
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Phase diagram of a polarized Fermi gas in the BEC-BCS crossover¹ Y.A. LIAO, W. LI, G.B. PARTRIDGE, R.G. HULET, Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston TX, 77251 — The phase diagram of a polarized Fermi gas in the BEC-BCS crossover is rich and largely unknown. We optically trap ⁶Li atoms with unequal population in the lowest two spin states.^{2,3} At the lowest temperatures in the unitarity regime, we observe phase separation between a paired superfluid core surrounded by the unpaired atoms. At higher temperatures but below the superfluid transition temperature, our data is consistent with a polarized superfluid state (Sarma phase). The Sarma phase is expected to dominate at zero temperature on the BEC side of the Feshbach resonance, while on the BCS side the gas is either phase separated (low P and T) or a normal fluid. We present our experimental mapping of the phase diagram as a function of P, T, and interaction.

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²G. B. Partridge *et al.*, *Science* **311**, 503 (2006).

³G. B. Partridge *et al.*, *Phys. Rev. Lett.* **97**, 190407 (2006).

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