

Abstract Submitted
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Phase Diagram of a Polarized Fermi Gas Across a Feshbach Resonance¹ WENHUI LI, YEAN-AN LIAO, GUTHRIE PARTRIDGE, RANDY HULET, Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston TX, 77251 — We investigate a Fermi gas of ⁶Li atoms with unbalanced populations in two spin states, whose interactions are tuned by a Feshbach resonance. At the unitarity limit, we observe three distinct phases connected by a tricritical point on a polarization vs. temperature (P - T) phase diagram: a phase-separated state at low T , a polarized superfluid and a polarized normal gas at higher T .^{2,3} We are currently mapping out the phase diagram as a function of P , T and interaction. At $T = 0$, as the interaction strength is tuned toward the BEC side of the resonance, we expect to encounter a phase boundary between the phase-separated state and the polarized superfluid. Conversely, on the BCS side, for finite P , a transition to the polarized normal gas is expected. We will present our latest results.

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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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