

Abstract Submitted  
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**Pairing and Phase Separation in a Polarized Fermi Gas** GUTHRIE PARTRIDGE, WENHUI LI, RAMSEY KAMAR, YEAN-AN LIAO, RANDALL HULET<sup>1</sup>, Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston TX, 77251 — We have prepared an ultra-cold gas of atomic fermions (<sup>6</sup>Li) with unequal numbers in two spin components. A Feshbach resonance is used to control the interaction strength between these components. In the unitarity regime within the Feshbach resonance, our data shows a critical polarization, beyond which the gas separates into a phase that is consistent with a superfluid paired core surrounded by a shell of normal unpaired fermions.<sup>2</sup> For near zero polarization, we measure the parameter  $\beta = -0.54 \pm 0.05$  describing the universal energy of a strongly interacting paired Fermi gas, and find good agreement with recent theory. We also find that the critical polarization diminishes with decreasing attractive interaction strength on the BCS side of the Feshbach resonance.

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<sup>2</sup>G. B. Partridge, W. Li, R. I. Kamar, Y. Liao, R. G. Hulet, *Science*, **311**, 503 (2006); published online 22 December 2005 (10.1126/science.1122876)

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