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Measurements of the Paired Fraction in the BEC-BCS Crossover[1]

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Pairing in fermionic systems is the essential ingredient of superfluidity and superconductivity. I will report quantitative measurements of the paired fraction of a two-spin Fermi gas of ^{6}Li atoms as a function of interaction and temperature. The paired fraction is determined by tuning a laser probe to resonance between the paired state and an excited molecular triplet level. A transition to the molecular state leads to a detectable loss of atoms, as in a previous experiment where the closed-channel fraction was measured by driving transitions to a molecular singlet level[2]. Depletion of correlated pairs occurs rapidly, and is easily distinguished from photoassociation of unpaired atoms. By driving the dominant triplet transition, the rate of excitation can be much faster than the time scale for pair reformation. This method can be used to quantitatively explore "preformed" pairing that occurs above T_c, a phenomenon reminiscent of high-temperature superconductors.

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[2]G.B. Partridge, K.E. Strecker, R.I. Kamar, M.W. Jack, and R.G. Hulet PRL **95** 020404 (2005).

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