

Studying the BCS-BEC crossover regime with a Fermi gas of atoms

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Recent years have seen the emergence of an intriguing Fermi system achieved with ultracold atomic gases. With these systems it is possible to widely tune the s-wave interatomic interaction strength using a Feshbach resonance. Of particular interest is the strongly interacting regime ($-1 < 1/k_F a < 1$) where a crossover between BCS theory of superconductivity and Bose-Einstein condensation (BEC) of molecules occurs. Recently experiments with ^6Li and ^{40}K have succeeded in studying many aspects of this superfluid Fermi system. In my talk I will focus on three experiments performed at JILA: a measurement of a phase diagram in the crossover, detection of fermionic atom pairs through atom shot noise, and a study the momentum distribution of a Fermi gas in the crossover in collaboration with M. Holland and S. Giorgini.