Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Realization of a Resonant Fermi Gas with a Large Effective Range

ERIC HAZLETT, YI ZHANG, RON STITES, KEN O'HARA, The Pennsylvania State University — We have measured the interaction energy and three-body recombination rate for a two-component Fermi gas near a narrow Feshbach resonance and found both to be strongly energy dependent. Even for deBroglie wavelengths greatly exceeding the van der Waals length scale, the behavior of the interaction energy as a function of temperature cannot be described by atoms interacting via a contact potential. Rather, energy-dependent corrections beyond the scattering length approximation are required, indicating a resonance with an anomalously large effective range. For fields where the molecular state is above threshold, the rate of three-body recombination is enhanced by a sharp, two-body resonance arising from the closed-channel molecular state which can be magnetically tuned through the continuum. This narrow resonance can be used to study strongly correlated Fermi gases that simultaneously have a sizeable effective range and a large scattering length.

Eric Hazlett
The Pennsylvania State University

Date submitted: 11 Nov 2011 Electronic form version 1.4