Lognumber: SES17-2017-000061

Abstract Submitted
for the SES17 Meeting of
The American Physical Society

Observing spin-energy correlation in weakly interacting Fermi gases.[1] SAEED PEGAHAN, JAYAMPATHI KANGARA MUDIYANSELAGE, ILYA ARAKELYAN, JOHN E THOMAS, North Carolina State University, JET LAB TEAM — Active manipulation of electron spin and spin current can be used to transport information with low dissipation and for creating quantum-entangled states. We study the formation of spin-energy correlations in a very weakly interacting Fermi gas of ^6Li contained in an optical trap with a spin-dependent potential. In the experiments, a uniform cloud containing a coherent superposition of spin states is created by radio-frequency pulse. After 800 ms, we observe spontaneous spatial separation of the spin-up and spin-down density profiles, for both quantum-degenerate and thermal Fermi gases. These results are explained by a collision-less mean-field model of spin-energy correlation. We also determine the temperature dependence of the magnetic field at which the s-wave scattering length vanishes and spin segregation ceases, providing new constraints on models of the molecular potentials.

[1]Physics division of the Army research office

Saeed Pegahan
North Carolina State University

Date submitted: 26 Sep 2017 Electronic form version 1.4