Spin-Imbalanced Fermi Gases from 1D to 3D

BEN A. OLSEN, MELISSA REVELLE, RANDALL G. HULET, Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston, TX 77005 — A spin-imbalanced Fermi gas confined to 1D tubes using a 2D optical lattice exhibits phase separation; a partially polarized superfluid core adjoins fully polarized or fully paired wings in each 1D tube, depending on the overall spin polarization. By decreasing the strength of the optical lattice, we vary the tunneling rate between the tubes and decrease the cloud’s 1D character. In the absence of a lattice, the 3D cloud separates into a fully paired core surrounded by excess unpaired spins. We report investigations of the spin density in spin-imbalanced Fermi gases confined in a range of lattice depths such that the character of the gas varies from 1D to 3D.

1Supported by DARPA, NSF, and ONR

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Date submitted: 28 Jan 2013   Electronic form version 1.4