

Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Search For The FFLO Phase In The Dimensional Crossover Of An Imbalanced Fermi Gas¹ YI JIN, JACOB A. FRY, EDUARDO IBARRA G. P., RANDALL G. HULET, Rice University — The Fulde–Ferrell–Larkin–Ovchinnikov (FFLO) magnetized superconductor has never been conclusively observed. Theory predicts that FFLO occupies a large region of the one-dimensional (1D) phase diagram and only a small region, if any, in 3D. Long range superfluid order is not supported in 1D and consequently, the FFLO superfluid should be more robust against thermal and quantum fluctuations in 3D. These considerations suggest that the 1D–3D dimensional crossover is a promising region to search for FFLO^{2,3}. Using a 2D optical lattice, we confine a spin-imbalanced Fermi gas of ⁶Li to 1D tubes. We bring the system to the dimensional crossover by increasing the inter-tube tunneling rate and the interaction strength in the BEC-BCS crossover regime. Observation of spatially periodic domain walls formed by the excess unpaired spins would constitute direct evidence for the FFLO phase.

¹Supported by an ARO MURI Grant, NSF, ONR, and The Welch Foundation

²M. M. Parish et al. Phys. Rev. Lett. 99, 250403 (2007).

³M. C. Revelle et al., Phys. Rev. Lett. 117, 235301 (2016).

Yi Jin
Rice University

Date submitted: 29 May 2019

Electronic form version 1.4