

Abstract Submitted
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Search for the FFLO phase in the dimensional crossover of an imbalanced fermi gas¹ YI JIN, EDUARDO IBARRA G.P., JACOB A. FRY, ANNA L. MARCHANT, MELISSA C. REVELLE, RANDALL G. HULET, Department of Physics and Astronomy, Rice University, Houston, TX 77005 — The exotic Fulde Ferrell Larkin Ovchinnikov (FFLO) magnetized superconductor has never been conclusively observed. It fills a large region of the one-dimensional (1D) phase diagram and is believed to occupy only a small region, if any, in 3D. The FFLO phase should be more robust, however, against quantum and thermal fluctuations in higher dimensions. These considerations motivated the proposal to search for FFLO near the 1D-3D dimensional crossover², which we have identified and characterized³. 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 tuning the inter-tube tunneling rate and the interaction strength in the BEC-BCS crossover regime. Domain walls carrying the excess unpaired spins would constitute direct evidence for FFLO pairs. These are expected to become more visible in a 1D time-of-flight expansion, which we induce with a blue-detuned laser beam. We report our progress.

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

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

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