

Abstract Submitted
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Search for the FFLO Phase in the 1D-3D Crossover of a Spin-Imbalanced Fermi Gas¹ JACOB A. FRY, BHAGWAN D. SINGH, RANDALL G. HULET, Department of Physics and Astronomy, Rice University, Houston, TX 77005 — The Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) type superconductor is exotic since it simultaneously supports superfluid and magnetic order, and thus, is a supersolid. This phase has yet to be conclusively observed either in condensed matter or in ultracold atomic gases. In one-dimension (1D), the FFLO phase is found in a large region of the phase diagram² - unlike in 3D where it is believed to occupy only a small region, if any. The FFLO phase is expected to be more robust against quantum and thermal fluctuations, however, in higher dimensions. These considerations motivated the proposal to search for FFLO near the 1D-3D dimensional crossover³, which we have identified and characterized⁴. We confine a spin-imbalanced Fermi gas of ⁶Li to 1D tubes using a 2D optical lattice. By increasing the inter-tube tunneling rate, we bring the system into the dimensional crossover, while interactions are tuned via an s-wave Feshbach resonance. We present our progress towards direct observation of the periodic domain walls which would be a definitive signature of the FFLO phase.

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²Y.-A. Liao et al. *Nature*. 467, 567-569 (2010)

³M. M. Parish et al. *Phys. Rev. Lett.* 99, 250403 (2007).

⁴M. C. Revelle et al. *Phys. Rev. Lett.* 117, 235301 (2016).

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