

Abstract Submitted
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Probing and Manipulating Fermi Gases Using Classical Impurities¹ LEI JIANG, LESLIE O. BAKSMATY, HAN PU, Department of Physics and Astronomy, and RQI, Rice University, Houston, TX, USA, HUI HU, ARC Centre of Excellence for Quantum-Atom Optics, Swinburne University of Technology, Melbourne, Australia, YAN CHEN, Laboratory of Advanced Materials and Department of Physics, Fudan University, Shanghai, China — Impurities can be used as probes to detect material properties and to understand quantum phenomena. Here we study the effect of a single classical impurity in ultracold s-wave Fermi superfluids. We use T-matrix and B-dG method to study both 1D and 3D cases to mean-field level. A magnetic impurity can induce a mid-gap bound state located inside the pairing gap. In addition, magnetic impurity can locally induce population imbalance in the system, potentially providing a method to realize FFLO-like state in a controlled way. We further extend the 1D impurity case to strong correlated region using DMRG. We also propose a modified RF spectroscopy to measure the local density of states, as a cold-atom analog of STM.

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