

Abstract Submitted  
for the DAMOP11 Meeting of  
The American Physical Society

**Classical Magnetic Impurity in Ultracold Fermi Superfluids<sup>1</sup>** LEI JIANG, LESLIE O. BAKSMATY, HAN PU, Department of Physics and Astronomy, and Rice Quantum Institute, Rice University, Houston, TX, 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 — In cold atom experiments, we have tools to create spin dependent optical potential, which gives us the possibility to achieve classical magnetic impurity in cold atom systems. Here we study the physics of magnetic impurity. A localized magnetic impurity can induce a mid-gap bound state, the Yu-Shiba state, in superfluid Fermi gas. We propose a modified RF spectroscopy to measure the local density of states, as a cold-atom analog of STM, which may be used to detect Yu-Shiba state. 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 demonstrate such a possibility by solving the self-consistent Bogoliubov-de Gennes equations.

<sup>1</sup>This work is supported by the NSF, the Welch Foundation and the DARPA OLE Program.

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Date submitted: 07 Feb 2011

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