

Abstract Submitted  
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**Single magnetic impurity in a spin-imbalanced superfluid Fermi gas**<sup>1</sup> JIAN LI, CHIN-SEN TING, Texas Center for Superconductivity and Department of Physics, University of Houston, TEXAS CENTER FOR SUPERCONDUCTIVITY AND DEPARTMENT OF PHYSICS, UNIVERSITY OF HOUSTON TEAM — A spin-imbalanced superfluid Fermi gas harmonically trapped in a two-dimensional optical lattice with a single classical magnetic impurity is investigated by Bogoliubov-de Gennes equations. In spin-balanced and weak spin-imbalanced case, we show that a strong magnetic impurity can change sign of the pairing order parameter. The amplitude of the sign-changed order parameter caused by impurity is affected by the strength of impurity potential, temperature and particle density. Compared to spin-balanced case, we find that an additional in-gap bound state can be induced by a strong magnetic impurity in weak spin-imbalanced case. In strong spin-imbalanced case where the Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) state is established as the ground state, the impurity induces wide spatial oscillations of pairing order parameters and can enhance the order parameters by suppressing the local spin-imbalance. Our results can be used to create and manipulate the FFLO state with magnetic impurities in spin-imbalanced Fermi gases.

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