

Abstract Submitted  
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**Bound states of a localized magnetic impurity in a superfluid of paired ultracold fermions** DAVID PEKKER, Physics Department, Harvard University, Cambridge, Massachusetts 02138, USA, ERIC VERNIER, Departement de Physique, Ecole Normale Supérieure, Paris, France, MARTIN ZWIERLEIN, MIT-Harvard Center for Ultracold Atoms, Research Laboratory of Electronics, and Department of Physics, Cambridge, MA 02139, USA, EUGENE DEMLER, Physics Department, Harvard University, Cambridge, Massachusetts 02138, USA — The nature of states formed around localized impurities can be a valuable probe of the properties of a quantum many body system. We propose using a deep optical lattice to localize an impurity atoms. We show that such an impurity atom acts like a magnetic impurity and leads to the formation of a pair of Shiba bound states inside the superconducting gap as well as possible bound states below the Fermi. The properties of these localized bound states can be read out using RF spectroscopy.

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