Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

A sign of change: pinning down the pairing symmetry of the iron-based superconductors EREZ BERG, Harvard University, NETANEL LINDNER, TAMAR PEREG-BARNEA, California Institute of Technology — Understanding the structure of the order parameter of the iron-based superconductors is the key to unveil their pairing mechanism. Although there has been much theoretical and experimental indications that the order parameter changes its sign in momentum space, direct evidence is still lacking. The difficulty stems from the fact that the order parameter is likely to be of s-wave symmetry, and therefore designing a phase sensitive experiment that would clearly reveal the sign change is non-trivial. Here, we examine a contact between a sign-changing superconductor and an ordinary, uniform-sign superconductor. If the the barrier between the two superconductors is not too high, the frustration of the Josephson coupling between different portions of the Fermi surface across the contact can lead to surprising consequences, such as time-reversal symmetry breaking at the interface and unusual energy-phase relations with multiple local minima. We propose this mechanism as a possible explanation for the half-integer flux quantum transitions in niobium-iron pnictide loops, which were discovered in a recent experiment (C-T. Chen et. al., Nature Physics 6, 260 (2010)).

Erez Berg
Harvard University

Date submitted: 02 Dec 2010 Electronic form version 1.4