Abstract Submitted
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Cooper Pair Formation from Quantum Magnetism in Iron-Pnictide High-Tc Superconductors[1] JOSE RODRIGUEZ, California State University at Los Angeles — We study how spin fluctuations mediate the formation of Cooper pairs in iron-pnictide high-T_c superconductors via a Schwinger-boson-slave-fermion analysis of a two-orbital t-J model for a square lattice of iron atoms that includes magnetic frustration and Hund's Rule coupling. The starting point is a hidden half-metal state across the two-orbitals that recovers correct nested Fermi surfaces at a quantum-critical transition with a commensurate spin density wave (cSDW) metal [1]. A mean-field approximation indicates that hidden spinwaves at zero 2D momentum [2] result in an s-wave Cooper-pair instability on the hole Fermi surface pockets centered at 2D momentum $(0, 0)$. Proximity to the quantum-critical transition results, additionally, in a simultaneous s-wave Cooper-pair instability on the electron Fermi surface pockets centered at 2D momenta $(\pi, 0)$ and $(0, \pi)$, but with a sign change. This mean-field prediction will be checked by extracting the amplitude for such s_{+-} pairing from exact numerical diagonalizations of the two-orbital t-J model over the 4×4 lattice with two holes.

[1] J. Rodriguez, M. Araujo & P. Sacramento, Phys. Rev. B 84, 224504 (2011).
[2] J. Rodriguez, Phys. Rev. B 82, 014505 (2010).

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