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Fermi Surfaces of Iron-Pnictide High-T_c Superconductors from the Limit of Local Magnetic Moments[1] MIGUEL ARAUJO, Universidade de Evora, Portugal, PEDRO SACRAMENTO, Instituto Superior Tecnico, Lisbon, JOSE RODRIGUEZ, California State University at Los Angeles — We study a 2-orbital t-J model for an isolated square lattice of iron atoms, which stack up to form an iron-pnictide high-T_c superconductor. The two orbitals in question are the degenerate $d\pm = 3d_{(x\pm iy)z}$ ones, which maximize the Hund's Rule coupling. First-neighbor and second-neighbor hopping (t) and Heisenberg exchange (J) are included. A Schwinger-boson-slave-fermion mean-field analysis yields a hidden half metal state in which holes hop through a $\nwarrow_{d+}\searrow_{d-}$ spin background without much hopping across orbitals. This state is characterized by an inner and an outer Fermi surface pocket centered at the Γ point. The Fermi surface pockets resemble those predicted by band structure calculations that include all five $3d$ orbitals. By sweeping the Hund's coupling, we also identify a quantum-critical point (QCP) where zero-energy spin-wave excitations exist at the momenta associated with commensurate spin-density-wave (cSDW) order. These low-energy spin-waves result in nested Fermi-surface pockets centered at cSDW momenta. Exact diagonalization of one hole in the 2-orbital t-J model over a 4×4 square lattice yields low-energy spectra that are consistent with the nested Fermi surfaces that are predicted to exist at the QCP.

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