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Effects of spin-orbit coupling and space group symmetry in multiorbital models for iron pnictides RONG YU, Department of Physics, Renmin University of China, Beijing 100872, China, EMILIAN NICA, Department of Physics and Astronomy, Rice University, Houston 77005, JIAN-XIN ZHU, Theoretical Division, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, QIMIAO SI, Department of Physics and Astronomy, Rice University, Houston 77005
— Motivated by recent experiments, we study the effects of spin-orbit coupling in multiorbital models for iron-based superconductors. We show that the spin-orbit coupling leads to a nontrivial hybridization among the three t2g bands in the Brillouin zone corresponding to the two-iron unit cell, as required by the space group symmetry of the system. We also consider the superconducting pairing in the presence of spin-orbit coupling, and in agreement with the space group symmetry. By calculating the dynamical spin susceptibility in the superconducting state, we find anisotropic spin resonance excitations in consequence of the breaking of spin rotational symmetry. We further discuss the connections between our results and recent ARPES and polarized inelastic neutron scattering measurements.

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