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Interorbital Pairing and its Physical Consequences in Iron Pnictide Superconductors[1] YI GAO, WU-PEI SU, Department of Physics and Texas Center for Superconductivity, University of Houston, JIAN-XIN ZHU, Theoretical Division, Los Alamos National Laboratory — We study interorbital pairings of iron pnictide superconductors within a minimal two-orbital tight-binding model. We find that in real space, a set of self-consistently determined pairing order parameters forms two sublattices with a relative phase of π and the pairing symmetry is $d_{x^2-y^2} \sim \cos k_x - \cos k_y$. In momentum space, it corresponds to the η pairing proposed by C. N. Yang [Phys. Rev. Lett. **63**, 2144 (1989)], with nonzero momenta of Cooper pairs. One physical consequence of this type of pairing is the existence of a significant amount of zero energy (gapless) states around the Fermi surface even in the absence of disorder, which contradicts current experiments thus excluding such a pairing in iron pnictide superconductors.

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