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S+iS superconductivity in hole-doped Fe-pnictides SAURABH MAITI, ANDREY CHUBUKOV, University of Wisconsin-Madison — The extended s-wave (s+-) symmetry proposed for Fe-pnictides requires flipping of the phase of the superconducting order parameter (the gap) on at least two pockets. In optimally doped BaK-122, the phase is flipped between the hole and electron gaps-but have the same phase on the hole gaps (e.g., both are +). But in the strongly hole doped sample only hole pockets remain, and ARPES experiments were interpreted as evidence for s+- symmetry. This requires flipping of the phase on a pair of hole pockets (one gap is + and another is -). We address this issue of ++ to +- transition of the hole gaps as doping is changed. We find that such a transition occurs via an intermediate phase of s+is type, in which time reversal symmetry is broken (TRSB state). The ++ and +- states are two end points of the s+is state. We show that TRSB state emerges at a single point at T_c, but the parameter range over which it exists widens as we go down in temperature down to $T = 0$. We investigate the structure of collective phase and amplitude gap fluctuations in the TRSB state and analyze the sensitivity of this state to the angular anisotropy of the interaction. We find that anisotropy-driven accidental gap nodes can survive in s+is state, unlike in s+id state (proposed for electron doped pnictides).

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