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Interplay between magnetism, superconductivity, and orbital order in 5-pocket model for iron-based superconductors – parquet renormalization group study MAXIM KHODAS, Hebrew University, LAURA CLASSEN, Heidelberg University, RUIQI XING, ANDREY CHUBUKOV, University of Minnesota — We report the results of the parquet renormalization group (pRG) analysis of the 5-pocket model for Fe-based superconductors. We use as an input the fact that excitations near all five pockets are made out of d_{xz}, d_{yz}, and d_{xy} orbitals. We argue, based on symmetry, that there are 40 different coupling constants, which describe the interactions between low-energy fermions in the orbital basis. All couplings flow under pRG. We find that there are four stable fixed trajectories of the pRG flow, separated by several unstable ones. Along the stable trajectories, the 5-pocket model effectively reduces either to a 3-pocket or a 4-pocket one.In both cases superconductivity wins over SDW, if the Fermi energies are small enough such that pRG runs over a wide energy range. The superconducting state has s^{+-} gap structure for both effective models, but the magnitude of the gap on hole pockets is different for 3-pocket and 4-pocket cases. Furthermore, the flow to effective 3- or 4-pocket models distinguishes between the origin of the nematic order. For the former care it is a vestigial magnetic order, while for the latter case it comes from spontaneous orbital order.

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