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Nodeless and Nodal Gaps in Iron-Based Superconductors B. ANDREI BERNEVIG, Princeton University, RONNY THOMALE, CHRISTIAN PLATT, CARSTEN HONERKAMP, WERNER HANKE, JIANG-PING HU — We use the functional renormalization group method to analyze the phase diagram of the iron-based superconductors. As in the previous studies by F. Wang, D.H. Lee et. al., we observe a nodeless sign- changind order parameter to be favored over a sizable part of the parameter space. We however also find several regions in which nodes develop on the electron Fermi pockets leading to a large quasiparticle density that gives rise to power laws in experimental observables. We analyze the dependence of the superconducting gap on the out-of plane momentum and investigate the possibility of line-nodes in the superconducting order parameter. Using several new models available in the literature (due to Kuroki, Graser and Raghu), we analyze the orbital content of the superconducting gap, which should be observable in spin-polarized ARPES experiments. We also show that effective, Fermi-surface models of iron-based superconductors miss important properties of the superconducting gap. We find that the effective theory of the Iron-based superconductors is a J1-J2 model in orbital space with J2¿ —J1— and antiferromagnetic.

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