Functional Renormalization Group Study of Iron-based Superconductors

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We apply the fermion functional renormalization group (FRG) method to determine the pairing symmetry and pairing mechanism of several iron-based high-Tc superconductors. From realistic five-orbital models fit to the band structure calculations and local repulsive interactions we find electronic driven pairing instabilities. For all materials considered (LaFeAsO, LaFePO, FeSe, and FeTe), the leading pairing instability is unconventional s-wave (s+-). But the details vary significantly between different materials. In particular the pairing in LaFePO is found to have accidental nodes on electron Fermi surfaces. By analyzing the RG flow we propose that the pairing mechanism is the inter-Fermi-surface pair scattering generated by the antiferromagnetic correlation.

References:
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