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Quasiparticle Interference in Iron-Based Superconductors JOHANNES KNOLLE, Max Planck Institute for the Physcis of Complex Systems, D-01187 Dresden, Germany, ALIREZA AKBARI, ILYA EREMIN, Ruhr-Universitat Bochum, D-44801 Bochum, Germany, RODERICH MOESSNER, Max Planck Institute for the Physcis of Complex Systems, D-01187 Dresden, Germany — The phase diagram of iron-based superconductors exhibits an anti ferromagnetic phase at low doping, an unconventional superconducting phase at larger carrier concentration, and possibly a coexistence regime of both orders in between. What are the signatures of the different orders in the electronic spectrum and how can phase sensitive measurements distinguish between different order parameter symmetries? To address these questions we systematically calculate quasiparticle interference (QPI) signatures for the relevant candidate phases of iron-based superconductors. Experimentally, QPI can be probed through spectroscopic imaging-scanning tunneling microscopy (SI-STM) thanks to impurities unavoidably present in the sample. We show that in the anti ferromagnetic phase the rotational symmetry of the electronic structure is broken, signatures of which are also seen in the coexistence regime with both superconducting and magnetic order. In the superconducting regime the different scattering behavior for magnetic and non-magnetic impurities allows us to verify the $s\pm$ symmetry of the order parameter. Furthermore, we discuss the effect of possible gap minima or nodes.

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