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Unconventional Superconductivity by Fermi Surface Mismatch: A Diagrammatic Monte Carlo Study JAN GUKELBERGER, Theoretische Physik, ETH Zurich, EVGENY KOZIK, Physics Department, King's College London, LODE POLLET, Department Physik, LMU Munich, KRIS VAN HOUCKE, Laboratoire de Physique Statistique, Ecole Normale Superieure Paris, NIKOLAY PROKOF'EV, BORIS SVISTUNOV, Department of Physics, University of Massachusetts Amherst, MATTHIAS TROYER, Theoretische Physik, ETH Zurich —
The conventional BCS pairing mechanism for s-wave superconductivity relies on spin rotation symmetry ensuring coinciding Fermi surfaces for both spin species. We study attractively interacting fermions on a square lattice where this symmetry is broken by imposing either a spin imbalance or a spin-dependent hopping anisotropy. The resulting Fermi surface mismatch disfavours conventional superconductivity making room for new kinds of order such as inhomogeneous or triplet superconductivity. We present unbiased numeric results for the low temperature phase diagrams of these models obtained with Diagrammatic Monte Carlo, a new technique for correlated fermionic systems based on sampling Feynman diagrammatic series directly in the thermodynamic limit.

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