Superconductivity and effective interactions in the two-dimensional t-t'-Hubbard model

A talk by Andreas Eberlein

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We study the superconducting ground state of the two-dimensional Hubbard model at weak coupling using the functional renormalization group within a purely fermionic setting. The effective Nambu two-particle vertex is parametrized in terms of boson-exchange interactions in the particle-hole and particle-particle channels, providing an efficient description of its singular dependence on momenta and frequencies. We compute the momentum dependence of the two-particle vertex on one-loop level and determine the d-wave superconducting gap as a function of the interaction, the next-nearest neighbor hopping and the fermionic density. Our results reveal a crucial role of the next-nearest neighbor hopping in the competition between antiferromagnetism and superconductivity and suggest the existence of an optimal value of the next-nearest neighbor hopping for pairing.