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Controlling Feynman diagrammatic expansions: physical nature of the pseudo gap in the two-dimensional Hubbard model[1] WU WEI, MICHEL FERRERO, ANTOINE GEORGES, Ecole Polytechnique, EVGENY KOZIK, Kin's College London — We introduce a method for summing Feynman's perturbation series based on diagrammatic Monte Carlo that significantly improves its convergence properties. This allows us to investigate in a controllable manner the pseudogap regime of the Hubbard model and to study the nodal/antinodal dichotomy at low doping and intermediate coupling. Marked differences from the weak coupling scenario are manifest, such as a higher degree of incoherence at the antinodes than at the 'hot spots'. Our results show that the pseudogap and reduction of quasiparticle coherence at the antinode is due to antiferromagnetic spin correlations centered around the commensurate (π, π) wavevector. In contrast, the dominant source of scattering at the node is associated with incommensurate momentum transfer. Umklapp scattering is found to play a key role in the nodal/antinodal dichotomy.

[1]Simons Foundation

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