Titel: Correlation induced localization

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Abstract:
The standard picture of the 3d Anderson localization is known to be restored in low-dimensional systems by adding either the correlations in the diagonal disorder or long-range hopping terms.

Recently, the Anderson's picture has been argued by providing counterintuitive examples of long-ranged systems with almost all localized states even in a nominally ergodic regime. These "new" models demonstrate either critical or localized wavefunction behavior with a "mysterious" duality of decay rates [1]. These systems belong to a new universality class where the localization properties are governed by hopping correlations.

In my talk I provide general localization-delocalization principles [2] needed for such models to find a full phase diagram and uncover the role of correlations and the origin of the duality [1]. I present a new class of random Hamiltonians with translation-invariant hopping terms demonstrating the duality in the momentum and coordinate space.

If time permits I will consider the stability of such fully-correlated long-ranged models to perturbations and their relations to constrained dynamics [3].

[1] X. Deng et al., PRL 120, 110602 (2018).
[2] P. A. Nosov, I. M. Khaymovich, and V. E. Kravtsov, Phys. Rev. B 99, 104203 (2019).
[3] P. A. Nosov, I. M. Khaymovich, Phys. Rev. B 99, 224208 (2019).