Abstract

Condensed Matter

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A hierarchical supersymmetric model for weakly disordered three-dimensional semimetals

Joint with G. Antinucci and M. Porta

An important open problem in quantum mechanics is to prove that three-dimensional lattice Schrödinger operators with extensive disorder exhibit a localization/delocalization transition as a function of the disorder strengh. We studied a hierarchical supersymmetric lattice model for Weyl semimetals with weak Anderson-type disorder. In the talk I will present a theorem about the algebraic decay of the disorder-averaged two-point correlation function, compatible with delocalization. Our method is based on a rigorous implementation of the renormalization group, reminiscent of the Gawędzki-Kupiainen block spin transformations. The main technical novelty is the multi-scale analysis of massless Gaussian convolutions with purely imaginary covariances via stationary phase expansions.