

Institute for Applied Mathematics, Bonn University

Oberseminar Stochastik

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Lipschitz-Saal (LWK 1.016)

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The Zigzag Strategy for Random Band Matrices

Random band matrices have entries concentrated in a narrow band of width W around the main diagonal, modeling systems with spatially localized interactions. We consider one-dimensional random band matrices with bandwidth $W \gg N^{1/2}$, general variance profile, and arbitrary entry distributions. We establish complete isotropic delocalization, quantum unique ergodicity (eigenstate thermalization), and Wigner-Dyson universality in the bulk of the spectrum. The key technical input is a family of local laws capturing the spatial decay of resolvent entries, established using a combination of Ornstein-Uhlenbeck dynamics and Green function comparison (the Zigzag strategy). Based on joint work with László Erdős.