

中国科学院

随机复杂结构与数据科学重点实验室

学术报告

题目: Delocalization and quantum diffusion of random band matrices in high dimensions

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时间: 2023年6月19日（周一） 10:00-11:00

地点: 数学院 N533

摘要: Consider a general class of random band matrices H on the d -dimensional lattice of linear size L . The entries of H are independent centered complex Gaussian random variables with variances s_{xy} , which have a banded profile so that s_{xy} is negligible if $|x-y|$ exceeds the band width W . In dimensions $d \geq 7$, we prove that as long as $W \geq L^\delta$ for a small constant $\delta > 0$, with high probability the bulk eigenvectors of H are delocalized in the sense that their localization lengths are comparable to L . In addition, we show that the delocalization is closely related to the quantum diffusion of this model, namely, the Green's function behaves in a similar way as that of a classical diffusion. Our proof is based on a high-order expansion of the Green's functions of H , where the key point is to show a self-energy renormalization up to arbitrary high order. Based on joint works with Changji Xu, Horng-Tzer Yau and Jun Yin.