Mathematics and CS Seminar

Multi-resolvent local laws for differently deformed Wigner matrices and applications in mathematical physics

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Let W be an $N\times N$ Wigner matrix and D a self-adjoint deformation of the same size. It is known that for large N, the resolvent $G(z)=(W+D-z)^{-1}$ of the deformed Wigner matrix $W+D$ concentrates around its deterministic approximation already for z just slightly above the real line. This concentration phenomenon also extends to the products of multiple resolvents, such as $G(z_1)BG(z_2)$ for a deterministic matrix B. Such results are called the multi-resolvent local laws. In our work we extend this framework by proving the 2-resolvent local law for $G_1(z_1)BG_2(z_2)$, where G_1 and G_2 are resolvents of two differently deformed Wigner matrices $W+D_1$ and $W+D_2$. In the talk we will discuss two applications of this result. The first one addresses the sensitivity of a quantum evolution to perturbations via studying the so-called Loschmidt echo, while the second one studies the decorrelation of eigenvectors of $W+D_1$ and $W+D_2$. The talk is based on a joint work with G. Cipolloni, L. Erd{\H o}s and J. Henheik.

Tuesday, November 12, 2024 04:30pm - 05:30pm
Office Bldg West / Ground floor / Heinzel Seminar Room (I21.EG.101)

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