UNIVERSITÄT BIELEFELD

Faculty of Physics
Faculty of Mathematics

THE UNIVERSITY OF MELBOURNE

Seminar

Bielefeld - Melbourne Random Matrices

Karol Życzkowski

Jagiellonian University, Cracow

The Spectra of Random Operations und Random Lindblad Operators

We analyze spectral properties of generic quantum operations, which describe open systems under assumption of a strong decoherence and a strong coupling with an environment. In the case of discrete maps the spectrum of a quantum stochastic map displays a universal behaviour: it contains the leading eigenvalue λ_1 = 1, while all other eigenvalues are restricted to the disk of radius R < 1. Similar properties are exhibited by spectra of their classical counterparts - random stochastic matrices. In the case of a generic dynamics in continuous time, we introduce an ensemble of random Lindblad operators, which generate Markov evolution in the space of density matrices of a fixed size. Universal spectral features of such operators, including the lemon-like shape of the spectrum in the complex plane, are explained with a non-hermitian random matrix model. The structure of the spectrum determines the transient behaviour of the quantum system and the convergence of the dynamics towards the generically unique invariant state. The quantum-to-classical transition for this model is also studied and the spectra of random Kolmogorov operators are investigated.

Wednesday, 07 April 2021, 0900 hrs CEST

Zoom Conference Call— Please contact Anas Rahman (anas.rahman@live.com.au) for details regarding access

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