Contribution ID: 103

Type: not specified

From classical to quantum Markov chains: known and new results

Monday, 19 December 2022 18:35 (20 minutes)

Since the first years of the 20th century, classical Markov chains have been a standard theoretical tool to model the statistics of a huge plethora of phenomena in physics, economics, biology, etc. Also, they are intensively used for Monte Carlo simulations [1]. The mathematical properties of these stochastic processes have been still studied over the last years because of their broad interest [2].

In this talk we will focus our attention on quantum Markov chains, the quantum counterpart of classical ones, commonly used in quantum information theory but also employed to describe neural networks [3]. Specifically, we will discuss known and new results about the asymptotics of these chains [4], comparing them with the analogous findings in the classical setting. Joint work with P. Facchi and A. Konderak.

References:

- [1] S. Brooks, J. R. Stat. Soc., 47 69 (1998);
- [2] F. Fidaleo, and E. Vincenzi, Stochastics, 1 (2022);
- [3] M. Lewenstein et al., Quantum Sci. Technol., 6 045002 (2021);
- [4] D. Amato et al., arXiv:2210.17513 [quant-ph] (2022).

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Session Classification: Session 4