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Statistics of quantum inteference in random positive maps
DANIEL BRAUN, University Toulouse and CNRS, LUDOVIC ARNAUD, Universite Libre de Bruxelles — We study the statistics of quantum interference for completely positive maps. The ensemble of maps is obtained from the unitary propagation of a larger system, with a propagator drawn from the Circular Unitary Ensemble (CUE), and tracing out environmental degrees of freedom. We calculate analytically the mean interference and its second moment for finite dimensional quantum systems interacting with a simple environment consisting of one or several spins (qudits), based on a measure of quantum interference introduced in (1). We show that the mean interference decays with a power law as function of the dimension of the Hilbert space of the environment, and determine that power as function of the temperature of the environment. The width of the interference distribution decays with a power law both as function of the dimension of the Hilbert space of the system and the Hilbert space of the environment. For sufficiently small system sizes we obtain the full interference distribution numerically.
(1) D. Braun and B. Georgeot, Phys. Rev. A **73**, 022314 (2006)
(2) L. Arnaud and D. Braun, Phys. Rev. A **80**, 062329 (2009)

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