Quantum Physics

Universality of spectra for interacting quantum chaotic systems

Wojciech Bruzda, Marek Smaczynski, Valerio Cappellini, Hans-Juergen Sommers, Karol Zyczkowski

(Submitted on 15 Mar 2010)

We analyze a model quantum dynamical system subjected to periodic interaction with an environment, which can describe quantum measurements. Under the condition of strong classical chaos and strong decoherence due to large coupling with the measurement device, the spectra of the evolution operator exhibit an universal behavior. A generic spectrum consists of a single eigenvalue equal to unity, which corresponds to the invariant state of the system, while all other eigenvalues are contained in a disk in the complex plane. Its radius depends on the number of the Kraus measurement operators, and determines the speed with which an arbitrary initial state converges to the unique invariant state. These spectral properties are characteristic of an ensemble of random quantum maps, which in turn can be described by an ensemble of real random Ginibre matrices. This will be proven in the limit of large dimension.

Comments:	11 pages, 10 figures
Subjects:	**Quantum Physics (quant-ph)**; Mathematical Physics (math-ph); Chaotic Dynamics (nlin.CD)
Cite as:	**arXiv:1003.2931v1 [quant-ph]**

Submission history

From: Wojciech Bruzda [view email]

[v1] Mon, 15 Mar 2010 14:43:21 GMT (190kb)

Which authors of this paper are endorsers?