Geometric Aspects of Extended Quantum Dissipative Systems

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We first [1] introduce a microscopic model to account for geometric effects when more than one dissipative unit is affected by a structured environment, showing that in some regimes there is a transition between the so-called common bath and separate baths. In the former one of the degrees of freedom of the multipartite system remains decoherence-free. This transition is shown to depend on distance as compared to a resonant wavelength for isotropic baths, while for anisotropic environments several surprising scenarios appear. The relation of this phenomenon to correlation lengths in the environment is studied, and also the appearance of a natural bath's frequency cutoff if the dissipative units have a finite size. Second [2], we investigate some models of microscopic noise in ion traps which are candidates for explaining the so-called anomalous heating, which is the fundamental hindrance for further trap miniaturization and has still an unknown origin. Probing such noise models with 2 ions and being able to discern between common bath and separate baths situations can help falsify aspects of those different models and therefore could be a fundamental tool for future experiments.

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[1] F. Galve, A. Mandarino, M. G. A. Paris, C. Benedetti & R. Zambrini, Scientific Reports **7**, 42050 (2017).

[2] F. Galve, J. Alonso & R. Zambrini (2017)