

Observing Information Backflow from Controllable Non-Markovian Multi-channels in Diamond

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Abstract

Any realistic quantum system is inevitably subject to an external environment. This environment makes the open system dynamics significant for many quantum technologies, such as entangled-state engineering, quantum simulation, and quantum sensing. The ordinary environment, usually consisting of a large number of degrees of freedom, is hard to control, despite some attempts on controllable transitions from Markovian to non-Markovian dynamics. Here, we demonstrate the engineering of multiple dissipative channels by controlling the adjacent nuclear spins of a nitrogen-vacancy center in diamond. With controllable non-Markovian dynamics of this open system, we observe that the quantum Fisher information flows to and from the environment using different noisy channels. In this talk, I will present the principle, the experimental schemes and results of information backflow from non-Markovian multi-channels.

References

- [1] Ya-Nan Lu *et al.*, Phys. Rev. Lett. 124, 210502 (2020).

Figures

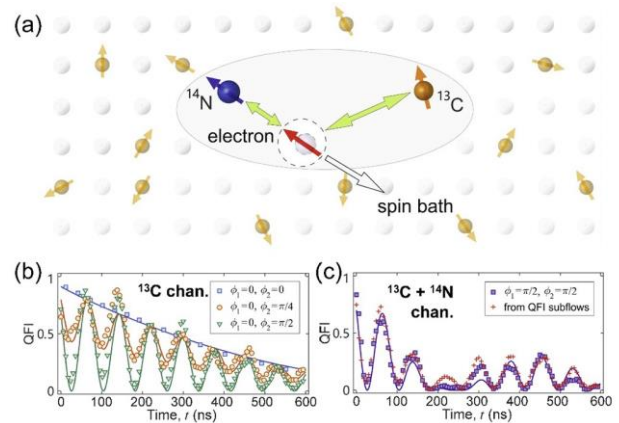


Figure 1: A schematic diagram and experimental results of quantum Fisher information (QFI) backflow from two non-Markovian channels.