

Invitation to IQST Seminar

on Thursday, May 3rd, 2018, 11.30am
Ulm University
N24, Room 101
Albert-Einstein-Allee 11



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Environment-Assisted Speed-up of the Field Evolution in Cavity Quantum Electrodynamics

Cavity quantum electrodynamics (CQED) is an open quantum system with dynamics that lends to detailed studies. We measure the quantum velocity of the evolution of the electric field state in a weakly excited CQED system. The system consists of a single mode of an optical cavity and a collection of atoms. Our experiment operates in the intermediate regime of the CQED where the atom dipole-coupling rate to the single mode of the cavity is comparable to the decay rate of the cavity and the atomic spontaneous emission rate.

We consider the mode of the electromagnetic field as the quantum system of interest, with a preferential coupling to a tunable environment: the atoms. By changing the number of atoms coupled to the optical cavity mode, we accelerate the speed to reach the steady state: the quantum speed of the repopulation of state in the optical cavity increases with the coupling between the mode of optical cavity and this non-Markovian reservoir (the number of atoms). We find a non-linear relationship between quantum velocity and the number of atoms in the system. This talk will introduce the platform and the quantum correlations to characterize it, and then show both the theory and the experiment.

A. D. Cimmarusti, Z. Yan, B. D. Patterson, L. P. Corcos, L. A. Orozco, and S. Deffner,
"Environment-Assisted Speed-up of the Field Evolution in Cavity Quantum
Electrodynamics," *Phys. Rev. Lett.* **114**, 233602 (2015)

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