Young IQIS 2020 - Young Italian Quantum Information Science Conference



Contribution ID: 19

Type: Oral

## Quantum Zeno and anti-Zeno effect in non-Markovian decay process of single-photon polarization states

*Friday, 2 October 2020 17:00 (15 minutes)* 

The quantum Zeno effect is a feature of quantum-mechanical systems allowing a system's time evolution to be freezed, or at least slowed down, by measuring the system frequently enough [1-5]. On the contrary, it is also possible to exploit frequent measurements to accelerate the system's evolution, obtaining the quantum anti-Zeno effect. In my presentation, I will describe an experiment investigating quantum Zeno and anti-Zeno effects in the non-Markovian decay process of single-photon polarization states. In our implementation, we simulate a noisy quantum channel exploiting a set of half wave-plates introducing correlated random phase shifts between the vertical and horizontal polarization components. Each phase shift represents a stochastic process defined by a random variable, sampled each time by a specific probability distribution depending on the previous phase shifts (non-Markovian behavior). This stochastic polarization dephasing leads to a decay of the probability to find the system in its initial state. To induce the Zeno effect, we perform repeated measurements by inserting a polarizer between subsequent wave-plates. By controlling the interplay between the application of a sequence of repeated measurements and the probability distribution characterizing the noise of the channel, it is possible to induce on the quantum state both Zeno or anti-Zeno effect. This experiment represents a proof of principle of a technique allowing to control the dynamics of a quantum system in any realistic physical scenario affected by time-correlated noise. In real scenarios, the randomness on the phase can be due to imperfections of the measurement apparatus or to the interaction with an external reservoir, usually entailing non-Markovianity [7] in the observed quantum system.

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Session Classification: Invited