

Reversal of Photon Scattering Decoherence in Ion-Qubits

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We experimentally studied the evolution of the electronic spin of a single trapped ion under spontaneous photon scattering. We have shown that the spin collapses on a measurement basis that is aligned with the scattered photon propagation direction. Furthermore we have shown that while Rayleigh scattering does not affect the spin state, Raman scattering rotates the spin direction by 180 degrees. Lastly, by utilizing ion-photon entanglement and feedback we were able to reverse photon scattering decoherence and maintain spin coherence in the presence of spontaneous photon scattering.

1. Nitzan Akerman, Shlomi Kotler, Yinnon Glickman & Roe Ozeri, arXiv:1111.1622; Phys. Rev. Lett. In press (2012)
2. Yinnon Glickman, Shlomi Kotler, Nitzan Akerman & Roe Ozeri, arXiv:1206.3847 (2012)