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Controlled single ion - single photon interactions

I present various experimental implementations of controlled emission and absorption of single photons by single ions. In one experiment, an ion emits single-mode coupled, bandwidth-tunable single photons [1] at high rate, which are absorbed by another ion at 1m distance. Emission in the sender ion is continuous or triggered; absorption in the receiver is signaled by a quantum jump. In another experiment, a single ion interacts with single photons from a SPDC photon pair source; here, absorption is heralded by the photon's entangled partner [2]. Absorption and detection in different polarization bases reveals the entanglement of the photons [3]; this is required for photon-to-atom entanglement transfer.

[1] M. Almendros et al., Phys. Rev. Lett. 103, 213601 (2009) [2] N. Piro et al., Nature Physics 7, 17 (2011) [3] J. Huwer et al., arXiv:1111.1085

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