Talk on "GaAs quantum dots: A Dephasing-Free Source of Polarization Entangled Photon Pairs"

17.05.2019 11:00

by Daniel Huber; Johannes Kepler Universität Linz

Entangled photon generation from semiconductor quantum dots via the biexciton-exciton cascade underlies various decoherence mechanisms related to the solid-state nature of the quantum emitters. So far, this has prevented the demonstration of nearly-maximally entangled photons without the aid of inefficient and complex post-selection techniques that are hardly suitable for quantum communication technologies. Here, we tackle this challenge using strain-tunable GaAs quantum dots driven under two-photon resonant excitation and with strictly-degenerate exciton states. We demonstrate experimentally that our on-demand source generates polarization-entangled photons with fidelity of 0.978(5) and concurrence of 0.97(1) without resorting to post-selection techniques. Moreover, we show that the remaining decoherence mechanisms can be overcome using a modest Purcell enhancement so as to achieve a degree of entanglement >0.99. Our results highlight that GaAs quantum dots can be readily used in advanced communication protocols relying on the non-local properties of quantum entanglement.

Host: P. Walther

Location:

Schrödinger room, Boltzmanngasse 5, 4th floor, 1090 Vienna