Seminar announcement

Tuesday, July 19, 2022
5 pm

ZNN, Seminar room EG 0.001
also ONLINE via ZOOM

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"Impact of the excitation scheme on the photon generation of a quantum dot"

A crucial ingredient for quantum communication is the generation of photons in either a single, entangled or Cluster state. Semiconductor quantum dots have emerged as bright source to create such photons on demand. Nonetheless, for applications it is required that the photon properties are ideal and the generation rate is sufficiently high. This has led to an ongoing search for the perfect single photon source. In this talk, we discuss the role of the optical excitation on photon generation.

Starting with the two-level system, the recently proposed Swing-UP of EmitteR Population (SUPER) is introduced [1]. This scheme uses two red-detuned pulses to excite the emitter, such that polarization filtering can be avoided. Because of the strong detuning, it could be expected that phonons do not disturb this process, however, attributed the strong driving, phonons still lead to a slight dephasing. Extending the system to four levels, we then consider the generation of entangled photon by the biexciton-exciton cascade in a quantum dot. When the biexciton is prepared using two-photon excitation, the excitation process itself induces a which-path information. This set a fundamental limit to the obtained concurrence.
These examples show that the excitation process plays a crucial role in finding the optimal photon source.

[1] Bracht et al., PRX Quantum 2 (4), 040354 (2021), Karli et al, arXiv preprint arXiv:2203.00712 (2022)
[2] Bracht et al., physica status solidi (b), 2100649(2022)
[3] Seidelmann et al., arXiv preprint arXiv:2205.03390 (2022)

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