Modeling spectral fluctuations in single quantum emitters

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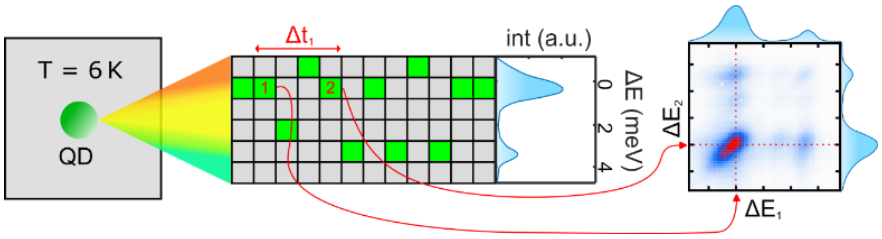

Abstract:

Under low temperatures, photons are emitted from a single nanocrystal at particular energies matching transitions from excited states back to the ground state. Unlike in a textbook, since in an experiment such nanoemitters always experience a noisy environment, the energies of emitted photons fluctuate over the experiment time. In our recent measurements, we were able for the first time to measure the correlation statistics of the photons' energies over a large range of timescales - from nanoseconds to minutes. While this data already generated surprising results, it is quite challenging to understand it quantitatively. The student in this project will use the simplest possible statistical model to replicate our experimental results, extracting new physical insights from a rich dataset.

Prerequisites: A course handling light-matter interaction is advantageous but not obligatory.