Universität Münster

Aktuelle Fragen der Nanophysik

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R87, Wilhelm-Klemm-Str. 10

Pulsed to continuous-wave quantum dot - microcavity dynamics

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In our labs, we try to advance the understanding of light and matter on the quantum level - with sources of single and entangled photons based on semiconductor quantum dots in optical micro-cavities.

In this lecture, I will first present our single quantum dot devices, and show how we do resonant single-quantum dot spectroscopy with picosecond laser pulses with custom electro-optic modulation of a continuous-wave laser. The flexibility of our pulser allows us to do coherent Rabi driving of a charged quantum dot transition and explore driving pulse regimes from coherent manipulation to decoherence.

Finally, we show an application of our single photons for a promising beyond-QKD quantum network application with a potentially pretty clear quantum advantage: quantum position verification. Here, the geographical location of a party acts as a credential for authentication - this is impossible classically, without meeting of the parties and exchange of a private key.