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### Mechanical Control of Excitonic States in Quantum Dots

Several systems are under investigation for their potential use in the fields of quantum information and communication. Semiconductor quantum dots (QDs), also dubbed “artificial atoms”, are one of such systems, as they can be used both as sources and hosts of “quantum bits” and can be easily integrated into compact devices and photonic structures. However, unlike natural atoms, no two QDs are identical - a major obstacle towards their actual application. In this talk I will show how elastic strain produced by novel piezoelectric actuators can be used to overcome problems arising from unavoidable fluctuations during QD growth and to reshape the QD electronic structure and excitonic emission after fabrication. I will first discuss the effects of strain on bulk GaAs and initially unstrained GaAs QDs in AlGaAs matrix [1-3]. After this, I will illustrate (on the InGaAs/GaAs material system) how any arbitrarily chosen QD can be employed as a wavelength-tunable source of entangled photon pairs [4,5]. This is achieved by integrating the QDs onto micromachined piezoelectric actuators capable of controlling the components of the in-plane strain tensor in the QD and surrounding matrix [3-4]. A discussion on future perspectives will conclude the talk. [1] Y. Huo et al. Nature Phys. 10, 46–51 (2014) [2] H. Huang et al., arXiv:1602.02122 [3] J. Martín-Sánchez et al., Adv. Opt. Mater. (2016) - DOI: 10.1002/adom.201500779 [4] R. Trotta et al., Phys. Rev. Lett. 114, 150502 (2015) [5] R. Trotta et al., Nature Comm. 7, 10375 (2016)

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