Quantum dots in nanowires, a novel solid-state platform for quantum optics and hybrid nanomechanics

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Semiconductor quantum dots are artificial atoms with exceptional optical properties, which are also sensitive probes of their photonic and mechanical environment. In this seminar, I will first briefly review the recent development of tapered nanowire antennas, which efficiently funnel the quantum dot (QD) emission into a directive output beam. Such antennas find direct applications to the realization of bright sources of non-classical states of light [1-3], and more generally to solid-state quantum optics. In the second part of the talk, I will see that material strain, which naturally occurs during the vibration of a nanowire, efficiently couples the QD emission energy to the wire vibration amplitude. The resulting hybrid nanomechanical system [4] has a strong potential for sensing applications [5,6] and, with further improvements, could contribute to the fundamental exploration of the classical-quantum boundary.

References: