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### Acousto-electric and acousto-mechanical control of optically active solid-state nanostructures

Surface acoustic waves (SAWs) are a versatile tool to dynamically control and manipulate the electronic and optical properties of solid state nanosystems at frequencies ranging from a few tens of megahertz up to a several gigahertz.

I will present recent experiments demonstrating radio frequency control of the charge state and emission energy of quantum dot nanostructures by the SAW mechanical deformation and the induced piezoelectric fields [1,2]. Furthermore, we employ the mechanical deformation of a SAW to dynamically modulate the optical resonance of photonic crystal defect cavities at gigahertz frequencies providing a direct route towards real-time control of light-matter interactions on this platform [3].

[1] S. Völk et al., Nano Letters 10, 3399 (2010) [2] S. Völk et al., Appl. Phys. Lett. 98, 023109 (2011) [3] D. A. Fuhrmann et al., Nature Photonics 5, 605 (2011)

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