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Optomechanical Crystals for Arrays

Within the last decade cavity optomechanical systems have dramatically advanced in the exploration of the quantum nature of mechanical oscillators. Ground state cooling, coherent optical to mechanical state transfer and the preparation of non-classical mechanical states are just a few examples of the progress in the experimental control of these systems. Some of the recent challenges in the field are the exploitation of optomechanical cavities as a storage for quantum information and for quantum operations and the realization of networks and arrays of optomechanical cavities.
One of the platforms that promisingly tackles these problems are optomechanical crystals. Different structures can thereby access a wide range of experimental parameters, still preserving a small footprint due to their on-chip integration. Their challenging fabrication however requires robust designs and/or means to compensate slight structural deviations. After a brief general introduction of optomechanical crystals, this talk will reveal a design for tunable optomechanical nanobeams that can enable phononic networks and a potential solutions for a 2D cavity for low temperature quantum optomechanics.