

Dynamics in optomechanical multi-mode systems and arrays

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Recent years have seen tremendous progress in coupling light to mechanical motion on the micro- or nano-scale. In this talk, I will discuss nonequilibrium dynamics that can be induced in optomechanical systems, especially those with several mechanical and/or optical modes. For a system with a membrane in the middle of an optical cavity, oscillations of the membrane can drive multi-level photon dynamics that exhibits effects analogous to atomic physics (Rabi oscillations, Autler-Townes splitting, and Landau-Zener-Stueckelberg interference). In the second part of the talk, I will discuss collective effects in an array of optomechanical resonators. These could be realized for example using the recently introduced concept of optomechanical crystals. There, synchronization between self-induced optomechanical oscillations takes place upon increasing the coupling strength. More generally, such arrays can open the door to the world of collective phenomena in the field of cavity optomechanics.