C2N General Seminar

Friday May 24th 2019 - 10h 00

Amphitheater of C2N

Opto-electro mechanics with photonic crystals

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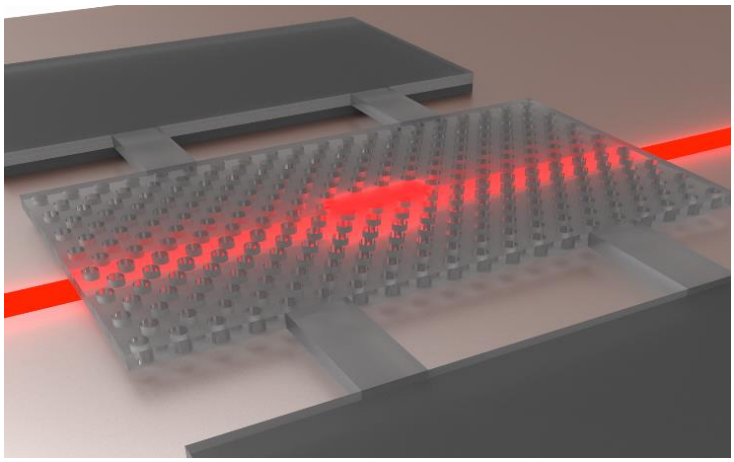
Optomechanics deals with the interaction of light with a mechanical oscillator. It utilizes the coupling between light and the geometry of a mechanical oscillator to read or tailor the mechanical motion of the resonator. This coupling is stronger at the nano-scale because of the very small mass of nano-mechanical resonator.

We investigate the nano-optomechanics of suspended photonic crystal membranes. Depending on the arrangement of holes, the membrane can either act as a deformable end-mirror in a conventional Fabry-Perot cavity or include a cavity of diffraction-limited volume that simultaneously confines both phonons (*i.e.* mechanical vibrations) and photons. These structures combine cavity enhancement and low mass and thus exhibit strong mechanical coupling to light. In particular, optomechanical resonators formed by conventional photonic crystal membranes sustain mechanical modes ranging from the MHz to the GHz frequency.



Artistic view of radiation pression in bidimensional photonic crystal cavity embedded in a suspended membrane.

Depending on the configuration, photonic crystal membranes developed at C2N, allows studying nonlinear dynamics of single and coupled opto-electromechanical resonators, reaching microwave optomechanical oscillators and also temperature metrology.

Rémy BRAIVE is associate professor in Université de Paris and CNRS-C2N since 2009. After a PhD in “Optics and Nanophotonics” at University of Paris VII/LPN, he joined MPQ Garching (Germany) and then EPFL (Switzerland) as a post-doc where he started to get involved in the fields of nano-optomechanics. Since 2009, he carries his research activities at C2N where he launched a new direction line on optomechanics with suspended photonic crystal membranes https://toniq.c2n.universite-paris-saclay.fr/fr/membres/remy-braive/.

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