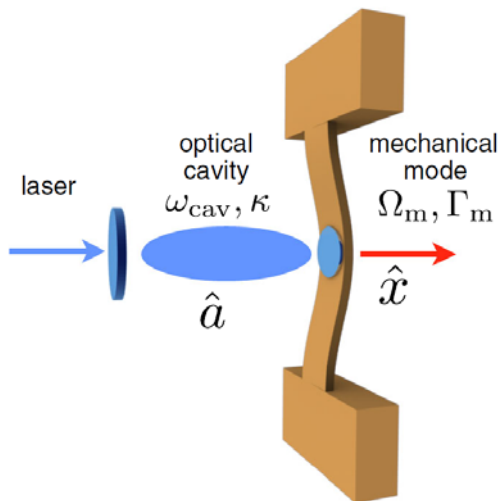
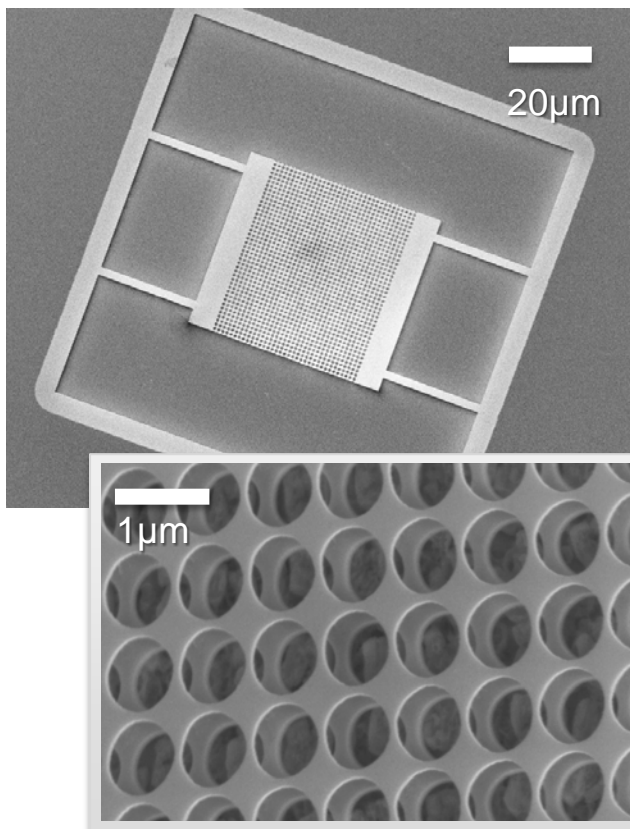


# Master thesis project

## Cavity optomechanics with photonic crystal reflectors



Our research group explores the control over mechanical motion – down to the quantum regime – for reaching novel capabilities in sensing and for fundamental studies. This project exploits the coupling of mechanical motion to light in so-called cavity optomechanical devices<sup>1</sup> (see image on the left). This coupling has already been used to cool mechanical resonators to the ground state of motion<sup>2</sup>, but new applications can be reached once the optomechanical interaction becomes much stronger.



Mechanically compliant, photonic crystal-type reflectors<sup>3</sup> (see image on the left) embedded in an optical cavity are a system that promises to increase the coupling appreciably<sup>4</sup>.

**This Master thesis project** will focus on the characterization of single- and double-layer photonic crystal slabs. This includes measurements of optical and mechanical properties of the slabs accompanied with simulations of these properties to understand the measurement results. **During the thesis you will learn** the physics behind optomechanical systems, their simulation in FEM, their fabrication and how to perform optical measurements in the lab.

For more information: [www.wieczorek-lab.com](http://www.wieczorek-lab.com)

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<sup>1</sup> M. Aspelmeyer, T. J. Kippenberg, F. Marquardt, *Rev. Mod. Phys.* **86**, 1391 (2014)

<sup>2</sup> J. Chan et al., *Nature* **478**, 89 (2011)

<sup>3</sup> S. Kini M., K. Elkhoully, J. M. Fitzgerald, M. Ekman, Y. Zhang, F. Zhang, S. M. Wang, P. Tassin, W. Wieczorek, *Appl. Phys. Lett.* **116**, 264001 (2020)

<sup>4</sup> A. Xuereb, C. Genes, A. Dantan, *Physical Review Letters*, **109**, 223601 (2012)