



Universität  
Basel

## Research Project

### Cooling and control of a nanomechanical membrane with cold atoms

#### Third-party funded project

**Project title** Cooling and control of a nanomechanical membrane with cold atoms

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**Organisation / Research unit**

Departement Physik / Experimentelle Nanophysik (Treutlein)

**Department**

**Project Website** <http://atom.physik.unibas.ch>

**Project start** 01.03.2015

**Probable end** 28.02.2019

**Status** Completed

The goal of this PhD project is to realize a hybrid optomechanical system in which ultracold neutral atoms are strongly coupled to the vibrations of a nanomechanical membrane inside an optical cavity. Laser light will provide a long-distance coupling between the two systems, enabling a modular setup where the membrane-cavity system is placed in a cryostat while the atoms are prepared in a separate room-temperature vacuum chamber. This system will be used to explore cooling and quantum control of the nanomechanical membrane with the atoms. Mechanical oscillators in the quantum regime offer new perspectives for precision force sensing, the realization of quantum transducers, and tests of quantum mechanics in massive systems.

**Financed by**

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