Florian Marquardt

Universität Erlangen/Nürnberg

Light, Sound, and Topology

In this talk, I will first give a brief introduction to the field of cavity optomechanics, where one couples radiation fields to the motion of mechanical resonators. I will then explain how optomechanical interactions can be exploited to modify the transport of phonons and photons in two-dimensional arrays of coupled optical and vibrational modes. These can e.g. be implemented in photonic crystal slabs. Engineering the light field wave front, it is possible to generate a topologically nontrivial bandstructure via the optomechanical interaction.
This gives rise to transport of sound waves along chiral edge channels that are robust against disorder. In the last part of the talk, I will indicate how one can even use a purely geometrical nanoscale design for chiral sound wave transport in a pseudo-magnetic field.

"Topological Phases of Sound and Light"
Vittorio Peano, Christian Brendel, Michael Schmidt, and Florian Marquardt, Phys. Rev. X 5, 031011 (2015)

"Pseudomagnetic fields for sound at the nanoscale"
Christian Brendel, Vittorio Peano, Oskar Painter, and Florian Marquardt, arXiv:1607.04321 (2016)