Nano

The Vienna Doctoral Programme on Complex Quantum Systems
invites you to a

Seminar Talk

by

Ewold Verhagen
Center for Nanophotonics, AMOLF, Amsterdam, The Netherlands

"Topological photons and phonons in nanophotonic systems"

Recent years have seen a surge of interest in bringing the concepts of topological physics - which have had such powerful implications in condensed matter - to other domains. In this talk, I will discuss our efforts to manipulate the on-chip transport of light and sound (mechanical vibrations) such that they exhibit unusual behavior, mimicking that of electrons in topological insulators.

I will briefly introduce the phenomena and appeal of unidirectional propagation and topological protection, which occur for electrons in strong magnetic fields or in materials with spin-orbit coupling. We study analogous mechanisms for photons and phonons on silicon chips, by suitably breaking temporal and spatial symmetries.

On the one hand, we directly observe photonic topological edge states in photonic crystals that exploit spatial symmetry breaking. We test the idea of topological protection and signatures of photonic spin-orbit coupling. On the other hand, we create optomechanical systems in which time-reversal symmetry is broken through optomechanical interactions. This has the same effect on photons and phonons as a magnetic field has on electrons. In that way, we demonstrate unidirectional components such as optical isolators and circulators, and show the emergence of quantum Hall physics in nanomechanical resonators.

Monday, 9 December 2019,
16:30h get-together with coffee and snacks!

Lise Meitner Hörsaal, Strudlhofgasse 4, 1st floor, Vienna

The seminar talk will be preceded by a CoQuS Student talk at 17:00h
by

Georg Arnold
IST Austria
" Bidirectional on-chip conversion between microwave and optical photons"

Hosted by: Peter Rabl