TRR 142
Tailored Nonlinear Photonics

TRR Guest Scientist Lecture / Seminar

Date/Time: 22.04.2021 / 15:00 Uhr
Location: Online - Zoom

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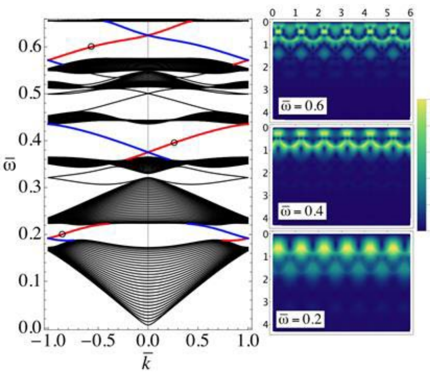
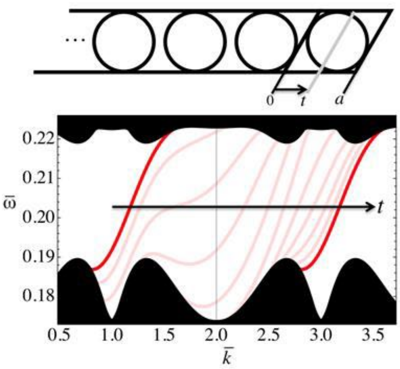
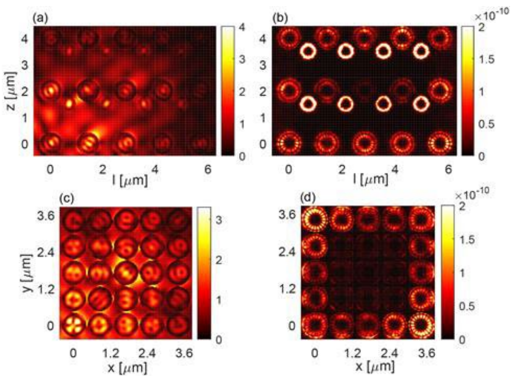
Nonlinear optics in topological photonic structures and clusters of nanoparticles

Abstract:

Topological photonics aims to utilize topological photonic bands and corresponding edge modes to implement robust light manipulation, which can be readily achieved in the linear regime of light-matter interaction. Unlike solid state physics, the common test bed for new ideas in topological physics, topological photonics provide an ideal platform to study wave mixing and other nonlinear interactions. These are well-known topics in classical nonlinear optics but largely unexplored in the context of topological photonics. In this talk, I will review some recent results regarding nonlinear interactions of one-way edge-modes in frequency mixing processes in topological photonic and plasmonic crystals. More specifically, I will present a detailed analysis of the band topology of certain photonic crystals and demonstrate that nonlinear optical processes, such as second- and thirdharmonic generation can be conveniently implemented via one-way edge modes of this setup. In addition, four-wave mixing of topological plasmon modes of graphene plasmonic crystals and second-harmonic generation upon interaction of valley-Hall topological modes of all-dielectric photonic crystals will also be discussed. In the last part of the talk, I will present a newly developed numerical method based on the multiple-scattering matrix theory for calculation of second-harmonic generation from arbitrary clusters of nanoparticles. As an application of this method, I will illustrate how one can use it to describe the nonlinear optical response of a certain class of metamaterials.







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