

VA 6: Gaede-Prize Talk (with O and DS)

Time: Wednesday 14:00–14:45

Location: H36

Prize Talk

VA 6.1 Wed 14:00 H36

Photonic Metamaterials: Novel Optics with Artificial Atoms

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At optical frequencies, electromagnetic waves interact with natural materials via the electronic polarizability of the materials. By contrast, the corresponding magnetizability is negligible. As a result, we can only directly manipulate the electric component of light while we have no immediate handle on the magnetic component. Photonic metama-

terials open up a way to overcome this constraint. The basic idea is to create an artificial crystal with sub-wavelength periods. Analogous to an ordinary optical material, such a photonic metamaterial can be treated as an effective medium. However, proper design of the elementary building blocks ("artificial atoms") of the photonic metamaterial allows for a non-vanishing magnetic response at optical frequencies - despite the fact that photonic metamaterial consist of non-magnetic constituents. This artificial magnetism can even lead to a negative index of refraction. In this presentation, I will review our results and present new developments in this interesting field.