O 51: Gaede-Prize talk (Linden, Stefan)

Time: Wednesday 14:00–14:45 Location: H36

Prize Talk O 51.1 Wed 14:00 H36

Photonic Metamaterials: Novel Optics with Artificial Atoms — •Stefan Linden — Institut für Nanotechnologie, Karlsruher Institut für Technologie (KIT)

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 metamaterials 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.