



Einladung zum Vortrag

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Thema: **Hyperbolic Metamaterials: en route to multiscale
photonics?**

Zeit: **Donnerstag, 9. Februar 2012, 13:15 Uhr**

Ort: **Newtonstraße 15, Raum 1'202**

Abstract:

In the past few years, optical science has seen an intense interest in metamaterials (structures with artificially designed elements much smaller in size than the wavelength of light). The ultimate goal is to be able to engineer materials rare or absent in nature. However, fabrication of metamaterials is still highly challenging, and very few of them ever made their way into practical use. Extremely anisotropic "hyperbolic metamaterials", in which dielectric permittivity can have different signs for different polarizations, will arguably be the first metamaterial to see practical uses, because of very simple geometries involved (metal-dielectric multilayers and nanorods) and because the associated physics does not rely on resonant properties and is robust with respect to losses. In the talk, we review the physics of wave propagation in multilayer-type hyperbolic metamaterials. We demonstrate that they transition from being a homogeneous extremely anisotropic medium to acting like a photonic crystal for bulk plasmonic waves. Aside from immediate practical applications such as strong broadband spontaneous emission enhancement and the design of scattering-free coatings, we explore the possibilities to use these waves as information carriers and look out into the realm of multiscale photonic devices, which combine structuring on wavelength and subwavelength scales.