

Einladung zum Physikalischen Kolloquium

Montag, 30.11.2009
16.15 Uhr, H2 (O25)

Prof. Harald Giessen
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“3D Metamaterialien: Spiel der Kopplungen”

Metallic metamaterials have shown a number of fascinating properties over the last few years. A negative refractive index, negative refraction, superlenses, and optical cloaking are some of the ambitious applications where metamaterials hold great promise.

We are going to present fabrication methods for the manufacturing of 3D metamaterials [1]. We are investigating their coupling properties and the resulting optical spectra. Hybridization of the electric [2] as well as the magnetic [3] resonances allows us to easily understand the complex optical properties.

Lateral as well as vertical coupling can result in EIT-like phenomena [4, 5].

The connection between structural symmetry and their electric as well as magnetic dipole and higher-order multipole coupling will be elucidated. It turns out that stereometamaterials [6], where the spatial arrangement of the constituents is varied, reveal a highly complex rotational dispersion.

[1] Na Liu, Hongcang Guo, Liwei Fu, Stefan Kaiser, Heinz Schweizer, and Harald Giessen: *Three-dimensional photonic metamaterials at optical frequencies*, *Nature Materials* **7**, 31 (2008).

[2] N. Liu, H. Guo, L. Fu, S. Kaiser, H. Schweizer, and H. Giessen: *Plasmon Hybridization in Stacked Cut-Wire Metamaterials*, *Advanced Materials* **19**, 3628 (2007)

[3] Na Liu, Liwei Fu, Stefan Kaiser, Heinz Schweizer, and Harald Giessen: *Plasmonic Building Blocks for Magnetic Molecules in Three-Dimensional Optical Metamaterials*, *Advanced Materials* **20**, 3859 (2008).

[4] Na Liu, Stefan Kaiser, and Harald Giessen: *Magnetoinductive and Electroinductive Coupling in Plasmonic Metamaterial Molecules*, *Advanced Materials* **20**, 4521 (2008).

[5] Na Liu, N. Liu, L. Langguth, T. Weiss, J. Kästel, M. Fleischhauer, T. Pfau, and H. Giessen: *Plasmonic EIT*, *Nature Materials* **8** (2009).

[6] Na Liu, Hui Liu, Shining Zhu, and Harald Giessen: *Stereometamaterials*, *Nature Photonics* **3**, 157 (2009).

