19.5.2009/Wh

Am Montag, dem 25.5.2009, 16.15 Uhr in W2-1-148

spricht

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über

"Light in and around photonic crystal structures -singularities and slow light losses"

Photonic crystals and plasmonic nanostructures can exert a huge control over light at the nanoscale, which is of both academic and industrial interest. Nanoconfinement of light can miniaturize optical chips and the slow light achievable with photonic crystals leads to increased light-matter interactions with a potential for new (bio)sensors. Implicit in the control of light at the nanoscale is that the light field itself no longer conforms to our everyday intuition in terms of plane waves or rays. Close to a nanophotonic structure the light field itself becomes highly structured. We have succeeded in measuring the structure of light in the near field of photonic crystal waveguides with phase-sensitive near-field microscopy. It turns out that the evanescent field of these waveguides is much richer than expected due to the Bloch nature of the eigenmodes. For example, it turns out that the light does not decay with a single or even multiple exponent away from the surface as might have naively been expected With a breakthrough in near-field microscopy we have succeeded to separate the two electric field components in to the plane above the waveguide structure and the phase difference between them. As a consequence we can reconstruct the polarization ellipse for every point above the nanophotonic structure. We find that the polarization above a photonics crystal structure is highly dependent on position to extent that the field even contains so-called polarization singularities

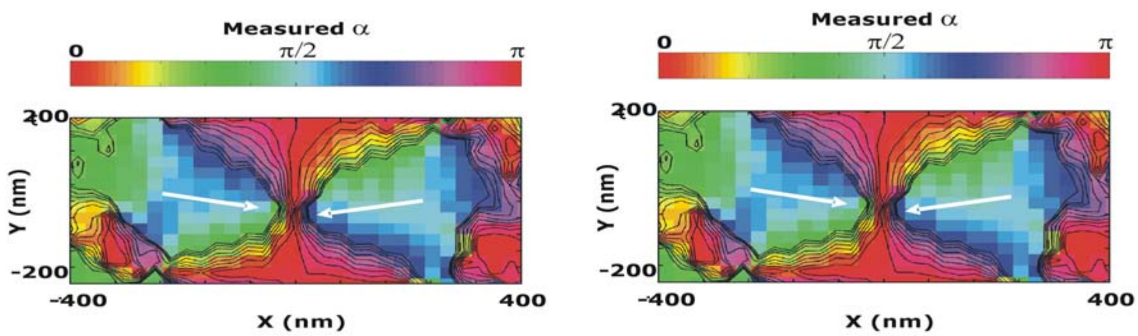

Figure: (left) Measured orientation angle of the polarization ellipse for 1 unit cell of a photonic crystal waveguide (scan area, 1 period x 2 periods of the photonic lattice). The black lines indicate isogyres, i.e., lines of constant orientation. At two locations the isogyres come together in a point, indicated with arrows: a polarization singularity. (right) Calculated orientation angle of the polarization ellipse.

Einladender: Christoph Lienau