Ultrafast dynamics in nanophotonic structures tracked in real space and in k-space

L. (Kobus) Kuipers,
Center for Nanophotonics, FOM Institute for Atomic and Molecular Physics (AMOLF), Kruislaan 407, 1098 SJ Amsterdam, The Netherlands.

Periodic structures greatly affect the eigenstates of waves whether they are electrons in solids, light waves in photonic crystals or plasmons in plasmonic crystals. The result may be slow light in photonic crystal waveguides [1] or extraordinary transmission in subwavelength metal hole arrays [1]. Small variations in the structure, intentional or not, can break the crystal symmetry and result in huge variations in optical properties. Near-field visualization of the light propagation with simultaneous topographical information allows the optical properties to be unravelled and related to geometry. Investigations in reciprocal space (k-space) allow the photonic eigenstates to be identified. By the tracking ultrafast dynamics of photonic eigenstates in k-space, we are able to follow their evolution and their mutual coupling even when they are co-located in real space.

[1] H. Gersen, *et al*., *Phys. Rev. Lett*. **94**, 073903 (2005).
[2] T.W. Ebbesen, *et al*., *Nature* **391**, 667 (1998).