Near-field investigation of chirped photonic crystal waveguides

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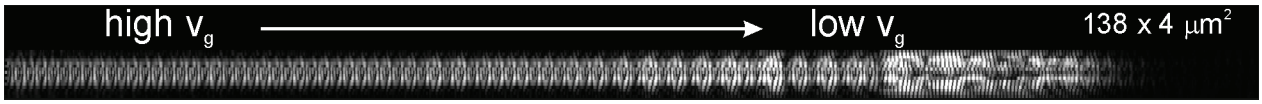
The propagation of light through photonic crystals is highly influenced the periodic geometry of the crystal. This property can be exploited for the engineering of specific dispersive properties like photonic bandgaps, slow light or negative refraction. Here we demonstrate that dispersion engineering can also be exploited on a local scale.

We changed the diameter of air holes alongside a photonic crystal waveguide in a gradual fashion: a so-called chirped waveguide. With our phase-sensitive near-field microscope we mapped the distribution of light inside the waveguide. Our measurements show that the local dispersion relation gradually changes, leading to a decrease in the group velocity as light propagates further into the waveguide. Towards the slow-light regime, the effect of local geometrical changes becomes more pronounced.



A near-field image of light propagating from left to right in a chirped waveguide.