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Polarization control of linear dipole radiation and photonic structures using tapered optical nanofibers

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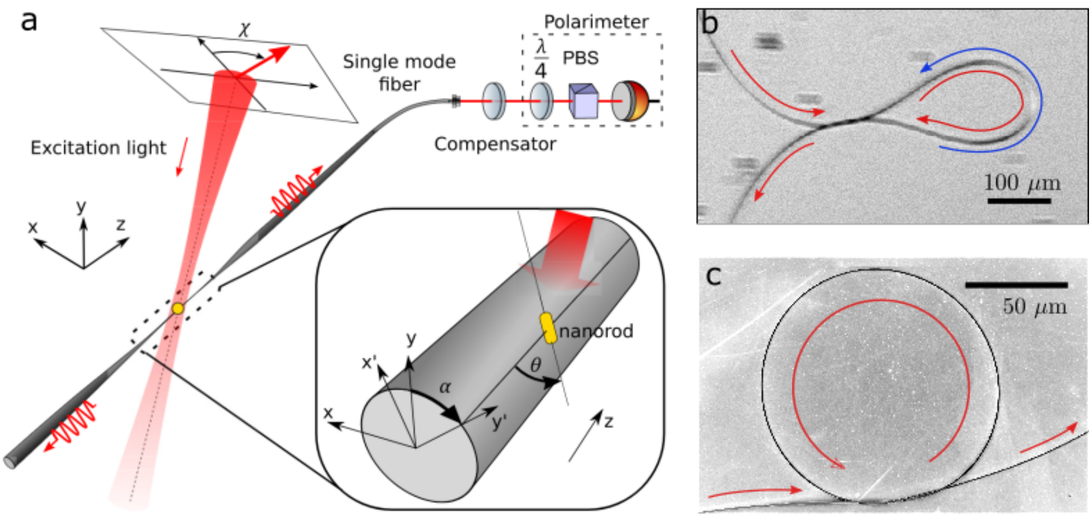

Figure 1: a, Experiment setup of the polarization control of linear dipole radiation. b, a ring interferometer. c, a knot resonator.

We experimentally demonstrate that a linear dipole is not restricted to emit linearly polarized light, provided that it is embedded in the appropriate nanophotonic environment. We observe the emission of various elliptical polarizations, including circularly polarized light, without the need for birefringent components, by coupling a linear dipole with a tapered nanfiber. The experimental demonstration is based on elongated gold nanorods deposited on an optical nanofiber and excited by a free-space laser beam. The light directly guided into the nanofiber is analyzed in regard to the azimuthal position and orientation of the nanorods. We demonstrate a mapping between purely geometrical degrees of freedom of a light source and all the polarization states. This could open the way to alternative methods for polarization control of light sources at nanoscale. Secondly, we report the fabrication and characterization of two types of photonic structures based on tapered nanofiber: a ring interferometer and a knot resonator. We propose a general approach to predict the properties of these structures using the linear coupling theory. In addition, we describe a new source of birefringence due to the ovalization of a nanofiber under strong bending due to Brazier effect.

Choix de session parallèle

6.3 Nanofibre optique: une nouvelle plateforme pour l'optique et l'information quantique

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