Exciting (nonlinear) things to do with custom microstructured optical fibers

Nicolas Joly[1,2]

[1] University of Erlangen, Staudtstr. 2, 91058, Erlangen
[2] Max Planck Institute for the Science of Light, Staudtstr. 2, 91058, Erlangen
nicolas.joly@fau.de, nicolas.joly@mpl.mpg.de

Photonic crystal fibers (PCFs), which consist of a periodic arrangement of air-channels surrounding the central core region are an ideal platform for all sort of nonlinear optics experiments ought to the possibility to modify their nonlinearity and their dispersion properties. These can either be tailored during fabrication or in-situ adjusted by modifying the pressure of an appropriate filling gas [1].

In this presentation, I will highlight on a few key applications of those fibres. On the one hand, using twisted all-normal solid-core PCFs, we can generate supercontinuum with very low noise features [2]. In a second part of the presentation, I will focus on the application of microstructured fibres for quantum optics. Like in any other fibres, the generation of photon relies on third order nonlinearity. By employing monatomic gas, we can create tunable pairs of entangled photons with remarkably broad spectral separation [3] or engineer the frequency content of the sidebands [4]. Using a molecular gas, we can even manipulate the quantum state through Raman scattering [5].

Références

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