

LAPHIA Seminar

Extreme nonlinear optics in hollow-core PCF

Fetah Benabid

Xlim - Limoges

2 April, 2014 from 1 :15 pm to 2 :15 pm

Institut d'Optique d'Aquitaine – Rue François Mitterrand – 33 400 Talence

We review the recent progress on hollow-core photonic crystal fibers (HC-PCF). An emphasis will be given to the new developed inhibited-coupling guiding hypocycloid core Kagome HC-PCF, and which led to new state-of-the-art in HC-PCF. A second emphasis will be drawn to the recent applications of HC-PCF in extreme nonlinear optics. One application relates to the high optical field regime, and where 1 milli-Joule energy, gigawatt peak power and close-to pettawatt/cm² intensity ultra-fast laser-pulses were successfully guided and compressed in HC-PCF. The guidance was achieved with low loss and in a single-mode fashion. The pulse compression is achieved in a self-compression manner, and sub-cycle pulses were, for the first time generated in the mid-IR spectral range. A second application underpins the emergence of plasma photonics and where a micro-wave plasma is successfully generated and stably confined in the micro-scaled core of a HC-PCF.

Fetah Benabid is a CNRS director of research and honorary professor at the universities of Bath (UK) and Western Australia (Australia). He is the group leader of Gas-Phase Photonic and Microwave Materials (GPPMM) at the CNRS UMR Xlim, Limoges, France. Fetah Benabid has pioneered the development of hollow-core photonic crystal fibres (HC-PCF) and their incorporation into scientific and technological applications. He is the inventor of Kagome HC-PCF and an all-fibre gas cells, coined photonic microcell (PMC). He is the inceptor of new optical guidance mechanism called inhibited coupling optical guidance, and the “photonic tight-binding model” to explain the formation of photonic bandgap in photonic crystal fibres. Fetah Benabid research interests covers guided photonics, gas-phase based nonlinear and coherent optics.

