Title : **2- 10 µm Mid-Infrared Supercontinuum Generation in Cascaded Optical Fibers: Experiment and modelling**

Authors: Sébastien Venck[1], Laurent Brilland[1], Radwan Chahal[1], Johann Troles[2], Marcello Meneghetti[2], Franck Joulain[3], Solenn Cozic[3], Samuel Poulain[3], Guillaume Huss[4], François St-Hilaire [5], Amar Nath Ghosh[5], John Dudley [5] and Thibaut Sylvestre [5]

[1] SelenOptics, 263 Avenue du Gal Leclerc, Campus de Beaulieu, 35700 Rennes, France

[2] University of Rennes, CNRS, ISCR-UMR 6226, F-35000 Rennes, France

[3]Le Verre Fluoré, 1 rue Gabriel Voisin, Campus Kerlann, 35170 Bruz, France

[4] LEUKOS, 37 rue Henri Giffard, Z.I. Nord, 87280 Limoges, France

[5] CNRS, FEMTO-ST Institute, University Bourgogne Franche-Comté, Besançon, France

250 Words abstract:

Mid-infrared supercontinuum (SC) sources in the 2 to 20 µm molecular fingerprint region are in high demand for a wide range of applications including optical coherence tomography, remote sensing, molecular spectroscopy, and frequency metrology. However, the spectral coverage of practical mid-infrared SC sources is limited by the availability of suitable mid-infrared pump lasers and the transmission windows of mid-infrared optical fibers. In this work, we investigate SC generation in a cascaded silica and soft-glass fiber system directly pumped with a commercially-available 500-ps pulsed fiber laser operating in the telecommunications window at 1.55 µm. This cascaded fiber system is shown to generate a flat broadband MIR-SC covering the entire range from 2 to 10 µm with several tens of mW of output power. This technique paves the way for cheaper, practical, and robust broadband SC sources in the mid-IR without the requirement of mid-infrared pump sources or Thulium-doped fiber amplifiers. In this talk, we provide the details of the experimental cascaded fiber system and discuss the parameters used for optimal spectral broadening. We also describe a fully-realistic numerical model used to simulate the nonlinear pulse propagation through the cascaded fiber system and we use our numerical results to discuss the physical processes underlying the spectral broadening in the cascaded system. We conclude with recommendations to optimize the current cascaded systems based on our simulation results.

100 Words abstract:

Mid-infrared supercontinuum (SC) sources in the molecular fingerprint region are in high demand for a wide range of applications including OCT, remote sensing, spectroscopy, and metrology. Here we demonstrate flat MIR SC generation from 2 to 10 µm using a cascaded silica and soft-glass fiber system directly pumped with a commercially-available 500-ps pulsed fiber laser at 1.55 µm. This technique paves the way for cheaper, practical, and robust broadband SC sources in the mid-IR without the requirement of MIR pumps sources or TDFA. We also describe a fully-realistic numerical model used to simulate the SC through the cascaded fiber system.