PhD candidate: Supercontinuum Generation for Next-Generation Tunable Ultrafast Lasers

Employer: Institut FEMTO-ST - CNRS - Université Bourgogne Franche-Comté (UBFC)

Location: FEMTO-ST, Université de Franche-Comté, Besançon, France

Funding: EUROPE Horizon VISUAL project

Start date: Early October 2024 till January 2025 – 3 years duration

Gross Salary: 2135 €/month (CNRS)

Fields: Laser Physics, Fiber Optics, Supercontinuum, Nonlinear Optics

Application Deadline: 15/08/2024; **Doctoral School** : ED SPIM

Applicants are invited to submit their application to thibaut.sylvestre@univ-fcomte.fr
Including CV, academic transcript, a report on any master's thesis or project, a cover letter and at least 1 reference letter
The main supervisors for this PhD position are Dr Thibaut Sylvestre, Pr. John M. Dudley and Pr. Gil Fanjoux.

About the job:

Interested in a European project bridging laser physics, fiber optics, and nonlinear optics? Want to make a fundamental and societal impact with your research? Consider applying for a PhD position at the FEMTO-ST research institute. Join a highly skilled and dedicated team of scientists and play a key role in developing new fiber designs for innovative applications in ultrafast laser technologies and supercontinuum sources.

In this position, you'll conduct advanced scientific research in photonics, focusing on photonic crystal fibers for nonlinear optics. Your responsibilities will include designing and developing state-of-the-art ultra-stable supercontinuum sources. The primary objective is to design the next generation of polarization-maintaining all-normal dispersion optical fibers for ultra-stable supercontinuum generation in the visible to near-infrared range from 0.6 µm to 1.4 µm. The ultimate goal is to develop supercontinuum-seeded optical parametric sources through optical parametric amplification (OPA) from 0.7 µm to 2 µm and direct difference frequency generation (DFG) from 3 µm to 10 µm, driven by novel high-repetition rate ultrafast Ytterbium lasers. This platform will offer high versatility in emission wavelength, pulse duration, and power/energy control.

This thesis will be carried out in the Optics Department of the FEMTO-ST institute (UBFC) as part of the European Project VISUAL, in collaboration with Amplitude Systems and Fastlite companies, the University of Lille, and INPHYNI in Nice.

For further details, please refer to the project website https://horizon-visual.eu/ and this review paper: T. Sylvestre et al., J. Opt. Soc. Am. B 38, 90-103 (2021). https://doi.org/10.1364/JOSAB.439330

Profile:

You are an excellent and highly motivated candidate with an MSc or an Engineer degree in physics, optics, lasers or equivalent qualification. You have basic training, knowledge, and prior hands-on covering in experimental optics, lasers, fiber optics. You like theoretical physics and numerical modeling using Matlab or Python. You are open-minded, curious and interested in working with both computer scientists and physicists. You have ability to take initiatives and work both in autonomy and in group. Good communication skills and fluency in written and spoken English are required. A basic level of French would be ideal to ensure effective communication.

We are:

The FEMTO-ST institute is the largest public research laboratory in the Burgundy-Franche-Comté region, located in eastern France, between Switzerland and Germany. With 7 scientific departments and around 750 collaborators, ranging from doctoral students to professors, FEMTO-ST conducts fundamental and applied research supported by industrial and public contracts, and hosts several start-ups covering many industrial sectors. The optics department enjoys international recognition, particularly in the fields of nonlinear optics, ultrafast optics, chaos and nonlinear dynamics, cryptography, nanophotonics, quantum photonics, and telecommunications. Our group consists of 30 permanent members, with an average of 10 PhD students produced per year. Renowned for pioneering work in nonlinear optics and telecommunications, our group has achieved significant milestones including experiments in optical chaotic encryption, optical frequency comb and supercontinuum generation, as well as advances in modeling nonlinear propagation in photonic crystal fibers.