

PhD position in Photonics

Deep learning applied to spatio-temporal control of a nonlinear multimode fiber laser source

Key words: photonics, deep learning, optical fibers, lasers, nonlinear optics, numerical simulations, experiments

Hosting laboratory: [XLIM UMR CNRS](#) 7252, FST de Limoges, 123 av. A. Thomas, 87060 Limoges

Duration: 3 years starting from November 2020

Deadline: 1st September 2020

Objective: The first goal will be to design a neural network architecture to study and control the spatio-temporal properties and couplings in a nonlinear multimodal guide. This study will be held in an amplifying regime to further lead to the development of an agile laser source emitting spatially and/or temporally shaped beams, thanks to a spatial light modulator placed at the input of the guide and controlled by the neural network.

Description : This PhD thesis is placed in the frame of a multidisciplinary project combining different scientific fields including Photonics, Mathematics and Computer Science. It is about investigating the contribution of deep or machine learning to the control of the emission of ultrashort laser sources. The PhD student will have to set up and manipulate neural networks and deep learning to control the emission properties of new laser systems based on multimodal optical fibers and spatial light modulators. On the one hand, it will be a question of better understanding the complex mechanisms of spatiotemporal couplings which appear in a multimode guide in nonlinear mode and of determining if they can be represented by a neural network. On the other hand, it will involve developing a real programmable platform for spatiotemporal shaping of laser beams from a multimode optical fiber. This work is at the crossroads of photonics and digital and will have as strong experimental as digital areas.

The PhD student will co-supervise by several researchers from the Photonics Department of XLIM research institute which is involved, among other research fields, in coherent and non-linear optics and lasers. He/she will also collaborate with researchers from Mathematics, Computer Science and Image Department of XLIM for optimization and deep learning aspects of this subject.

Requirements:

The candidate should have MSc in photonics, physics or related fields and must have solid knowledge in Photonics, including coherent and nonlinear optics. Applicants should have good skills in numerical tools and languages (Python, MATLAB). Good communication skills are essential, as the successful candidate will need to work in a team gathering members from different research fields.

Salary: 1550 euros net/month

Application: Applicants should send a letter of motivation and a detailed CV, including the contact details of at least two academic referees to supervisors:

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