

Master 2 "Systèmes Complexes, Optique, Lasers (SCOL)": Research Training 2022-2023
 Master 2 "Matter Molecules and their Environment(MME)": Research Training 2022-2023

Appel à sujet de stage recherche / Call for research training subject

Laboratory: PhLAM

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Collaborator(s): Kudlinski Alexandre

Topic: Nonlinear Optics

Master 2: select the master and the most appropriate option

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| <input checked="" type="checkbox"/> Master 2 SCOL | <input type="checkbox"/> Master 2 MME (GP-SCP) |
| <input type="checkbox"/> Option Complex Systems (GP-IKS) | <input type="checkbox"/> Option Condensed Matter |
| | <input type="checkbox"/> Option Condensed Matter/Pharma |
| | <input type="checkbox"/> Option Dilute Matter and Spectroscopy |
| | <input type="checkbox"/> Option Atmospheric Sciences |
| | <input type="checkbox"/> Option Modeling at the molecular & atomic scales |

Title: Theoretical and numerical study of the nonlinear dynamics in Fabry-Perot micro-resonators.

Abstract (no more than 2000 characters)

Optical frequency combs (OFCs), consisting of a set of phase locked equally spaced laser frequency lines, have enabled a great leap in precision spectroscopy and metrology. Nowadays, OFCs are cornerstones of a wealth of further applications ranging from chemistry and biology to astrophysics and including molecular fingerprinting and LIDARs among others. Driven passive optical resonators constitute the ideal platform for OFCs generation in terms of compactness and low energy footprint. The enabling mechanism of frequency combs are nonlinear phenomena such as modulation instability and the generation of solitons. These phenomena are well characterized in unidirectional resonators (e.g. ring resonators). In folded resonators, such as Fabry-Perot cavities, forward and backward direction of propagation are coupled, making the analysis of nonlinear phenomena much more complex.

The candidate will study nonlinear effects in fiber-based Fabry-Perot micro-resonators. In particular, he will analyze the generation of new spectral bands from a continuous wave input. He will develop new mathematical models and codes for the numerical simulation of the predicted phenomena.

Key words: nonlinear optics, solitons, modulation instability, frequency combs