Contrats doctoraux 2026

Titre du projet de thèse : Synchronization and Nonlinear Dynamics in an Optical Lattice

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Résumé du projet de thèse (en 20 lignes maximum) :

The study of nonlinear light propagation is a highly active field of research, renowned for its complexity and the rich physical phenomena it reveals. Coupling these nonlinear dynamics with a lattice structure, where light can tunnel between sites, enables the exploration of collective effects such as gap solitons and synchronized arrays of photonic resonators.
This PhD thesis aims to investigate both numerically and experimentally the emergence of nonlinear phenomena in a unique lattice of coupled fibre rings. In this system, light evolves in discrete steps. This kind of evolution leads to nonlinear dynamics that are fundamentally distinct from those in standard photonic lattices, giving rise to effects like unconventional thermalisation, localisation-delocalisation transitions, long-range synchronization across the lattice and novel topological phases [1].
The main objective is to study these effects, never observed before in an experimental setting, through numerical modelling and laboratory experiments. This PhD thesis is part of a collaboration with the École Normale Supérieure de Lyon and the Institute for Fundamental Physics in Madrid.

Group website: https://photonlattices.eu/

[1] R. Asapanna et al., Phys. Rev. Lett. 134, 256603 (2025).

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Remarques/commentaires supplémentaires :