

PhD GRANTS 2024**PhD project title:** Génération of frequency combs in fibered Fabry-Pérot cavities**PhD Supervisor:** A. Mussot / M. Conforti

PhD project summary (max. 20 lines):

Optical frequency combs are groundbreaking light sources that have significantly advanced precision measurement science, exemplified by the Nobel Prize in Physics awarded to Theodore Hänsch in 2005. Their applications are diverse, ranging from pollutant detection to autonomous car distance measurement and even exoplanet detection [1].

In this PhD thesis, we aim to develop innovative frequency-comb light sources by using short-fiber Fabry-Perot resonators, of a few centimeters long. These sources, consisting of an optical fiber surrounded by two highly reflective mirrors, offer the benefits of compactness, easy integration into fiber systems, and a versatility exploiting the large variety of optical fibers available (such as single-mode, polarization-maintaining, multimode, multicore, and photonic crystal fibers).

The PhD thesis's primary goals are to explore the complex dynamics these sources can offer, particularly in generating broad frequency combs through soliton generation – ultra-short pulses approximately 100 fs in duration. This research could lead to the creation of novel cavity designs for generating multi-frequency combs or exploiting phonon/photon interactions [2]. The PhD will be predominantly experimental but will include numerical simulations to aid in understanding and designing the cavities to be investigated. This thesis work will be conducted within the photonics team, providing a dynamic scientific environment and fostering close collaboration with the team's research groups.

Key words : Kerr Frequency combs, Fabry-Pérot cavities, solitons