

PhD Position

Towards Multi-parameter Fiber Sensing through Fiber Bragg Gratings in Aerospace

PhD location:

- University of Saint-Etienne (<https://www.univ-st-etienne.fr>)
- IRT Saint-Exupéry Toulouse (<https://www.irt-saintexupery.com/fr/>)

Supervisors:

Emmanuel Marin / Sylvain Girard (UJM, publication records of the MOPERE group
<https://scholar.google.com/citations?user=7ID9c8QAAAAJ&hl=fr>)

Keywords:

Optical fiber sensor, Fiber Bragg grating sensor, Optical fiber sensing in aircraft

Context:

This PhD position is offered within the framework of the APISS (Aircraft Photonic Interfaces Standardization for Sensing) project, funded by the French national research agency (ANR). The APISS project aims to reduce the dependency on proprietary aircraft health monitoring solutions by adopting a standardized and unified approach to photonic technologies that ensures:

- an interoperability between existing and future market solutions,
- an optimization of the merit factors (e.g. mass, consumption, volume, number and types of sensors, lifetime, survivability/resistance),
- a scalability of multi-functional sensing, and
- an improvement of operational efficiency and safety.

The APISS consortium comprises several industrials (Airbus, Safran, Cailabs, Sentea, Collins, etc.) and academics (UJM, LAAS).

Your Job:

The main goal of the PhD is to identify and test a versatile sensing chain, based on Fiber Bragg Gratings (FBG) technology, optimized for the aeronautical context, and allowing to monitor a variety of environmental parameters such as temperature, strain, load, damage, etc. In addition to increasing the maturity level of these sensing solutions for aerospace, the PhD thesis outputs will serve as input knowledge for their standardization. It will also help select the most suitable solutions for the different subparts of the acquisition chain: interrogator, sensing technology, connectivity/functionalization, sensing point architecture and packaging. With regards to innovation tasks, the PhD candidate will investigate how the modal control of the FBG interrogation in multimode optical fibers can improve the performances of standard FBGs in single-mode fibers, and how it can facilitate the implementation of such multi-parameter sensor.

Your Profile:

- Successfully completed scientific master's degree in physics or materials science with excellent grades, preferably with a specialization in optics and photonics
- Knowledge of at least one programming language
- Keen to tackle interdisciplinary problems and collaborate
- Eager to complete a PhD within three years
- Excellent organizational skills
- Ability to show initiative and work independently
- Excellent cooperation and communication skills, and ability to work as part of a team
- Highly proficient in spoken and written English

References:

- IRT Saint-Exupéry: <https://www.irt-saintexupery.com>
- Hubert Curien Laboratory: <https://laboratoirehubertcurien.univ-st-etienne.fr/en/index.html>

Contact:

Emmanuel Marin, emmanuel.marin@univ-st-etienne.fr, +33 477 915 809
Sylvain Girard, sylvain.girard@univ-st-etienne.fr, +33 477 915 812