

Postdoctoral position available in optoelectronics (18-months)

Subject: Advanced control of acousto-optic filter performance by long ultrasonic pulses for hyperspectral imaging

The study is in the general context of optical devices for communications and spectral analysis of optical signals with a particular focus on improving the performance of acousto-optic filters.

Acousto-optic tunable filters (AOTFs) are among the technologies commonly used in hyperspectral imagers. Once the fabrication of an acousto-optic filter is completed, its wavelength transmission function, particularly its selectivity, is fixed. However, for quasi-collinear acousto-optic interaction, our team has shown the possibility of dynamically modifying this transmission function, using a specific electrical control based on radio frequency pulses [1]. Work has validated the concept in the context of a perfectly collimated optical wave in a TeO₂ crystal.

The proposed subject consists in extending the study to divergent optical signals in order to get closer to the real conditions of hyperspectral imaging. The objectives are as follows:

- The development of a model so as to evaluate the performance changes caused by optical divergence, in terms of selectivity, SFDR and diffraction efficiency. This model will first be applied in the case of a classical electrical excitation (static model), and then relying on existing numerical models in the laboratory, in the case of different acoustic pulse configurations (dynamic model). Theoretical results will be compared with experimental studies.
- The proposal of new forms of radio frequency signal to control the shape of the wavelength response of the filter in order to adapt to different constraints. The solution may be to use phase-controlled, multi-frequency RF signals to generate a suitable acoustic network.

The proposed work includes a theoretical dimension, with the development of a simulation model, and an experimental dimension involving measurement setup.

The researcher will be employed by the ENIB (Ecole Nationale d'Ingénieurs de Brest). He will join the ASMP (Architecture et Système Microonde et Photonique) team of the Lab-STICC laboratory.

The applicant must:

- **Have spent at least 18 months abroad between May 2019 and the beginning of the project.**
- **Have supported his thesis for less than four years.**
- **Have completed his studies and defended his PhD in an institution located outside of western regions of France (Brittany or Pays de la Loire). A PhD co-supervised with an institution located in Brittany or Pays de la Loire is not eligible.**

The applicant must have a PHD degree. He must demonstrate theoretical and practical skills in the field of optoelectronics. In addition to the ability to work effectively in a team and to communicate the obtained results, the scientific skills required to carry out this project are both theoretical and practical. Knowledge in both optics and electronics is required. It is necessary to understand the physical phenomena at the origin of the interaction between optical and acoustic waves. Moreover, an experiment in simulation under Python or Matlab™ will be appreciated.

The job is to be filled from end of 2023 for a period of 18 months.

Gross monthly salary: 2650 €

Application procedure: The application should be sent by email as a single PDF file containing the following documents:

- a detailed curriculum vitae, including a description of previous experiences, a list of publications,
- a motivation letter for the position,
- professional references.

to André Pérennou : perennou@enib.fr and Véronique Quintard : quintard@enib.fr

About the Lab-STICC:

The Lab-STICC is a research unit of the French national center for scientific research (CNRS) involving two universities (Université de Bretagne Occidentale, Brest; Université de Bretagne Sud, Lorient) and three graduate schools of engineering (IMT Atlantique, ENSTA Bretagne and ENIB). The Lab-STICC is a multidisciplinary research laboratory in the field of Information and communication science and technology. Researchers work in a single structure within one central theme: "from sensor to knowledge"

<https://www.labsticc.fr>

About the ENIB:

Located in Brest, at the western tip of France in Brittany, ENIB is one of the highly selective French Grandes Écoles d'Ingénieurs. The Brest National School of Engineering is accredited by the Commission des Titres d'Ingénieur (CTI), the independent organisation responsible for the accreditation of engineering curricula and higher education institutions in the field of engineering. As part of the Brest-Iroise technology cluster, which houses leading laboratories and innovative companies, ENIB enjoys an exceptional setting right by the sea.

<https://www.enib.fr/en>