

Postdoctoral position in Microwave Photonics

Subject	Microwave-Photonics Advanced Components for high-speed applications (RoF, LiFi, LIDAR, ...)
Laboratory	ESYCOM
Starting date	01 February 2024
Final date	31 December 2026
Net Salary	~ 2300 € / month
Funding	BPI France - Important Projects of Common European Interest
Location	Gustave Eiffel University, Esiee-Paris, 2 boulevard Blaise Pascal - BP 99 93162 Noisy-le-Grand CEDEX • FRANCE
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Context

The present postdoctoral research takes place in the frame of PIEC project PURELIGTH. The project aims at developing of experimental setup for DC and analog characterizations of photonics devices and circuits. The targeted applications are optical communication: radio over fiber and LIFI.

The photonic/microwave components will be widely used in ultra-high-speed, low-cost, low-consumption communications networks that will enable future intra-building and/or inter-building communications within the city and in future 6G applications. These future communications will take place at increasingly higher frequencies (millimeter and THz) and will be associated with advanced modulation formats (FBMC, OFDM) and broadband to obtain ultra-high speed at all points. Radio-over-Fiber approach is being pushed into these bands to simplify remote antenna systems, to offer high density networks and to optimize the power emissions. The developments from 5G to 6G are also pushing towards the study of optical wireless communications of the LiFi type. The study of such systems and their integration is therefore essential, all the more so with the deployment by operators of optical fiber to the home with FTTH (Fiber To The Home) networks.

The host lab is ESYCOM involving research in the fields of communication systems, sensors and microsystems for the city, the environment and people. More specifically, the topics covered are:

- antennas and propagation in complex media, photonic components - microwaves;
- microsystems for environmental analysis and depollution, for health and the interface with living organisms;
- micro-devices for mechanical, thermal or electromagnetic ambient energy recovery.

The postdoctoral position deals with the first topic.

Work objectives

The objective of this PhD position is to develop an experimental platform for the development of ultra-fast interfaces for new generations of communication systems and more particularly for LiFi, Optical Free Space, LIDAR and Radio-over-Fiber applications. The platform will be used to advanced characterization of the microwave-photonic components, and in particular broadband BiCMOS SiGe phototransistors, Lasers, VCSELs and associated integrated photonic circuits in the bands 1-20 GHz to around 70 GHz. The other tasks are:

- Development of ultrafast Si/SiGe heterojunction phototransistor (HPT) in the near visible and near infrared range in B55 and B55X technologies (integration into existing processes).
- Development of fundamental building blocks using HPT transistors for linear function (Trinsimpédance Amplifier) and non-linear function (Compression Dynamic Range, frequency synchronization, mixing, ...) to address the targeted markets.



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— Enhancement of the system performances through application of linearization techniques or signal processing.

Knowledge and skills required for application

- PhD degree in Photonics, electronics or applied physics.
- Solid experience in instrumentation is necessary.
- Programming in Matlab or other language (C/C++, Python).
- Motivated by the development of innovative experimental setup-up for the characterization of photonic-microwave devices and circuits.

Application procedure

The applicant should be sent by email the following documents:

- A detailed curriculum vitae, including a description of previous experiences, a list of publications.
- A cover letter for the position.
- Professional references will be appreciated.