

----- JOB ANNOUNCEMENT -----

POSITION TITLE

Post-doctoral fellowship in transmission and sensing over hollow-core-fibers

TELECOM PARIS

Télécom Paris, a school of the IMT (Institut Mines-Télécom) and a founding member of the Institut Polytechnique de Paris (IP Paris), is one of the top 5 French engineering schools.

The mainspring of Télécom Paris is to train, imagine and undertake to design digital models, technologies and solutions for a society and economy that respect people and their environment. The school is committed to providing an environment conducive to the development of all students and research professors and is voluntarily and sustainably committed to an ambitious plan for social and ecological transition.

An inclusive campus on a "human scale" but with a strong international component, Télécom Paris is recognized for its proximity to companies. This public school guarantees excellent employability in all sectors and is the leading engineering school for the entire digital vertical (from hardware layers to uses). Télécom Paris is at the heart of a unique innovation ecosystem, based on interaction and on the importance of project mode in its training on the one hand, and on its interdisciplinary research on the other. Its faculty members are affiliated with two research laboratories: the LTCI laboratory (Laboratoire de Traitement et de Communication de l'Information) and the i3 laboratory, Institut interdisciplinaire de l'Innovation (I3 - UMR 9217 of the CNRS).

Télécom Paris is positioned as an open-air laboratory for all the major technological and societal challenges: artificial intelligence, quantum computing, IOT, cybersecurity, large-scale digital equipment (Cloud), 5G/6G, Green IT. Based in Palaiseau, at the heart of the IP Paris campus, Télécom Paris also has an incubator based in Paris at the heart of the French start-up ecosystem.

The COMELEC department situates its action within the framework of the knowledge triangle that links education, innovation and research. As such, in the department, we train engineers and doctoral students, we conduct academic research in the field of information technology and finally, we place our application research and innovative developments in a cooperative approach with industry and emerging companies.

Within COMELEC, the Optical Telecommunications Group (GTO) is home to the research programs of eight faculty members and a state-of-the-art laboratory on optical fiber transmission. We conduct advanced research in high-rate fiber-optic transmission, optical network architectures, novel lasers for communications, integrated photonics, and distributed optical fiber sensors.

SCIENTIFIC CONTEXT

Context of the research project

Hollow-core photonic crystal fibers (HCPCFs) have recently reached a technological breakthrough with propagation losses as low as 0.1 dB/km at 1550 nm—comparable to or even better than standard telecom fibers [1-2]. Because light propagates primarily in air, HCPCFs exhibit 30–40% lower latency, ultra-low dispersion, and negligible optical nonlinearities. These unique properties make them highly

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promising for next-generation telecommunication systems, long-haul quantum key distribution (QKD), and distributed sensing.

The proposed project aims to develop and demonstrate the next generation of hollow-core photonic crystal fibers (HCPCFs) for high-speed data transmission and sensing. With light propagating in air rather than glass, HCPCFs enable lower latency and negligible optical nonlinearities compared to silica fibers, addressing key challenges for future data centers and optical networks. Our ambition is to demonstrate 400 Gbps transmission over a few kilometers of fiber samples from novel designs and investigate the potential of sensing applications over these HCPCFs. Such achievements require overcoming stringent specifications in single-mode guidance, polarization control, and low bend and coupling losses.

Two complementary groups will co-supervise the work, GPPMM, internationally recognized for HCPCF design and fabrication [3-5] and GTO, a leader in demonstration of high-speed optical communication and sensing systems [6-8]. Iterative feedback between fabrication and system-level testing will ensure that the fiber properties meet operational transmission and sensing requirements. Methodologically, the project combines numerical modeling, characterization and experimental validation across the C-band. Modeling and signal processing for polarization tracking developed at GTO will help in assessing and optimizing the transmission performance of HCPCFs designed and characterized at GPPMM.

About the PLEIADES project

The PLEIADES project is part of the PEPR "Networks of the Future" program funded by the ANR and consists of a consortium of 14 partners. One of the work packages focuses on next-generation hollow-core fibers and brings together many academic labs including LTCI, XLIM and PHLAM.

[1] Y. Chen et al., "Hollow Core DNANF Optical Fiber with <0.11 dB/km Loss," 2024 Optical Fiber Communications Conference and Exhibition (OFC), San Diego, CA, USA, 2024, pp. 1-3. <https://doi.org/10.1364/OFC.2024.Th4A.8>.

[2] S. Gao et al., "40km, 0.052dB/km and 83km, 0.076dB/km in Interstitial-Tube-Assisted Hollow-Core Fiber", 2025 European Conference on Optical Communication (ECOC), Copenhagen, Denmark, 2025. <https://doi.org/10.1109/ECOC66593.2025.11263318>

[3] B. Debord et al., "Hollow-core fiber technology: the rising of "Gas Photonics"", MDPI – fiber, paper review, 7, 16, 2019. <https://doi.org/10.3390/fib7020016>.

[4] J. Osorio et al., "Hollow-core fibers with reduced surface roughness and ultralow loss in the short-wavelength range", Nature communications, Vol. 14, Number 1146, 2023. <https://doi.org/10.1038/s41467-023-36785-6>

[5] F. Amrani et al., "Low-loss single-mode hybrid-lattice hollow-core photonic crystal fiber", Light science and applications, Vol. 10, Article 7, 2021. <https://doi.org/10.1038/s41377-020-00457-7>

[6] J. Liu et al., "Sequence Selection With Dispersion-Aware Metric for Long-Haul Transmission Systems," in Journal of Lightwave Technology, vol. 42, no. 14, pp. 4818-4828, 2024. <https://doi.org/10.1109/JLT.2024.3385109>

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[7] P. K. Choudhury and É. Awwad, "Wavelength and Code Orthogonality Based Distributed Acoustic Sensing over a Passive Optical Network," in OFC2025, W3J.3. <https://doi.org/10.1364/OFC.2025.W3J.3>

[8] Élie Awwad, Maria Freire-Hermelo, Diane Prato, Pierre Pruvost, Pallab Kumar Choudhury, et al.. « Distributed Acoustic Sensing Over Deployed Telecommunication Fiber Networks: Opportunities and Challenges" 2026. [hal-05713205](https://hal.archives-ouvertes.fr/hal-05713205)

JOB DESCRIPTION

MAIN RESPONSIBILITIES AND DUTIES

The principal goal is to demonstrate hollow-core photonic crystal fibers optimized for high-speed data transmission, quantum communication, and distributed sensing. This goal is structured around the following objectives:

1. Evaluate the fibers within a single-wavelength 400 Gbps transmission system using dual-polarization IQ modulators and advanced digital signal processing (DSP).
2. Study polarization effects and modal dynamics using numerical modelling. Adapt DSP to the polarization and modal dynamics of HCPCFs if required.
3. Demonstrate quantum key distribution (QKD) and/or distributed sensing over a few kilometers of HCPCFs.

Industrial and Dissemination objectives

1. Industrial Integration and Connectorization
 - a. Collaborate with GLOphotonics to develop reliable fabrication and connectorization solutions compatible with standard telecom infrastructures.
 - b. Extend achievable HCPCF lengths and mechanical robustness for realistic deployment.
2. Scientific and Technological Outcomes
 - a. Publish our results in major conferences and journals demonstrating disruptive potential of HCPCF for both classical and quantum optical links.
 - b. Provide experimental data guiding standardization efforts for the next generation of hollow-core fibers and systems.

Methodology and work plan

The collaboration between GTO and GPPMM ensures iterative feedback between fiber design and system validation, which is crucial for aligning fiber performance with real-world

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communication requirements. The expertise also provides an ideal training environment for the post-doctoral candidate, combining material science, optics, and communication engineering.

Task 1 – Classical Transmission Demonstration (Months 1–12)

- State-of-the art of recent transmission demonstrations using hollow-core fibers
- Evaluate the transmission performance of a first sample of HCPCF provided by GPPMM using a 400 Gbps transmission testbed (BER, losses, polarization dynamics compared with a standard SMF-28 fiber).
- Optimize the DSP (MIMO equalization or modulation scheme) to mitigate potential residual propagation effects.
- Develop a simulator to model the polarization dynamics in HCPCF.
- Feedback to GPPMM targeting an optimized design for the future HCPCF sample.

Task 2 – Quantum and Sensing Applications (Months 6–18)

- Demonstrate QKD transmission through HCPCF using existing testbed at GTO. Assess polarization drift and stability over time.
- Conduct distributed optical fiber sensing (DOFS) experiments for monitoring using existing testbed at GTO.

We will also encourage the post-doctoral candidate to engage in workshops with GLOphotonics, with partners in the national PEPR PLEIADES project and with telecom industry stakeholders.

POSITION RESPONSIBILITIES

- 1. Perform research missions in the field of photonics**
 - Carries out research missions within the framework of the Department's contracts in the field of optical communications and fiber optic sensors
 - Participates and ensures the realization of project deliverables
- 2. Ensure supervision and tutoring missions**
 - Supervises student projects and engineering internships
- 3. Contribute to the reputation of the School, the Institut Mines-Télécom and the Institut Polytechnique de Paris**
 - Publishes the results of his/her research work
 - Carries out presentations and conferences
 - Participates to creation of intellectual property (patents)
 - Maintains close relations with academic institutions, research centers and companies



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SKILLS

Required skills, experience, and knowledge:

- The candidate must have successfully finished a PhD in Electrical Engineering, Optical Communications, Photonics or related domains,
- Knowledge of optical transmission systems and networks is necessary. Knowledge of digital signal processing algorithms involved in communication systems or optical fiber sensors is desirable,
- Skills in DSP programming (through MATLAB or Python) are appreciated,
- Strong interest for applied research,
- Ability to work in a multi-cultural environment and to supervise interns and/or students during projects,
- Proficiency in English.

Other abilities and skills:

- **Ability to work in a team, dialogue and writing skills,**
- **Interpersonal and pedagogical skills,**
- **Ability to synthesize.**

REQUIRED QUALIFICATIONS

Candidates with the following qualifications may apply:

- PhD in Electrical Engineering

ADDITIONAL INFORMATION

Date posted: September 10, 2026

Type of contract: **Post-doctoral fellow**

Duration of the contract: **18 months**

Foreseen starting date: March 2027

Location: Télécom Paris, 19 Place Marguerite Perey, Palaiseau 91120, France

Department/Unit: COMELEC (Communications and Electronics)

Superior/Supervisor: Élie Awwad

Category / job title: II – P

Category / titles agents can apply for: II

APPLICATION INSTRUCTIONS



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Applications should be submitted using the following link: [URL RECRUIT](#) and include:

- A detailed CV
- A cover letter
- Any element considered useful for the examination of the application

In order to be considered, applications must be received no later than: October 31, 2026

Scientific contact person: Élie AWWAD (elie.awwad@telecom-paris.fr)

Administrative contact person: Hamidou YAYA KONÉ (hamidou.kone@telecom-paris.fr)

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All our positions are open to individuals with disabilities.*