Master 2 "Photonics, Complex and Quantum Systems (PhoCQS)": Research Training 2025-2026
Master 2 "Matter Molecules and their Environment (MME)": Research Training 2025-2026

Appel à sujet de stage recherche / Call for research training subject

Laboratory: Institute for data Processing and Electronics (IPE), Karlsruher Institute of Technology (KIT), Germany.

Notes: in close collaboration with the PhLAM. Financial supports for the travel/stay: GP IKS .

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Collaborator(s): Serge Bielawski (PhLAM), Christophe Szwaj (PhLAM),

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Topic: Electronics-photonics interface, fast imaging, particle accelerators

Master 2: select the master and the most appropriate option

X Master 2 PhoCQS (GP-IKS)	□ Master 2 MME (GP-SCP)
X Option Complex and Quantum Systems	□ Option Condensed Matter
	□ Option Condensed Matter/Pharma
	□ Option Dilute Matter and Spectroscopy
	□ Option Atmospheric Sciences
	□ Option Modeling at the molecular & atomic scales
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Max. 2000 characters

Development of an ultrafast camera destined to accelerator physics

Context. There is a need for ultrafast measurements systems in various domains of fundamental sciences and technology, e.g., fast imaging, spectroscopy, particle accelerator physics, etc. Research on ultrafast measurements suggested that further progress may be made by **associating** research teams working on cutting-edge photonics (such as time lenses, photonic time-stretch, etc) **AND** cutting-edge electronics/data processing software development. A collaboration including PhLAM and KIT (funded by several French and German agencies) aims at exploring such possibilities during the 2026-2031 period.

Intership description. The project aims at developing a "hybrid" electronic/photonic system and applying it to fundamental studies at PhLAM and at accelerator facilities.
During the Master internship period, the work will focus on the system-level integration (hardware and software) and the optimization of a Silicon and InGaAs linear array at KIT (KALYPSO, currently the fastest detector of its kind worldwide). The student will be actively involved in the final testing and characterization of the KALYPSO detector, including its calibration for the PhLAM application and the equalization of the detector response across all 1024 channels to ensure optimal detection efficiency.

Competences. The internship focus on digital electronics, and will thus involve an important numerical work. This will requires a good level in programming (prior expertise in Python is mandatory). Note that a background in electronics is NOT mandatory at all (needed knowledge will be taught at KIT). This internship is precisely an occasion to acquire a complementary expertise.

Key words:

Electronics, FPGA, photonics, Python, ultrafast, accelerators, Free-Electron Lasers.