

PhD Position in Optical Networks-on-Chip

The FOTON Laboratory is offering a 36-month Ph.D. scholarship in the area of optical networks-on-chip (ONOCs) for multi-core computer architectures. In particular, the project will explore new optical functionalities for on-chip transmission and signal processing.

Project description

Optical communication technologies are pursuing their migration from their realm of long distance and high-capacity links towards metropolitan or access networks, and even shorter-reach applications. High-capacity interconnects are becoming widely used in the context of data centres and it is foreseen that optical technologies will soon also become pervasive within computers and servers, and even on computer chips themselves. Three dimensional computer core architectures, including an optical layer enabling communication between the cores at high speed and with potentially reduced energy consumption, are becoming the object of increased attention.

While a number of concepts that have been devised for larger-scale optical networks may still be applicable to optical networks-on-chips, the specificities of this new application obviously need to be taken into account. New optical and optoelectronic components are required, allowing high-speed operation on a reduced footprint and with low power consumption. Furthermore the network functionalities need to be adapted to the specific traffic requirements of inter-core communications, as well as to the limitations in terms of size and power consumption set by the on-chip environment.

In this project, new concepts will be investigated for on-chip networks. These include in particular the novel technique of mode-division multiplexing in conjunction with wavelength division multiplexing. New device concepts, including the use of specifically developed compact laser sources that can be integrated on the silicon platform will also be given consideration. Prospective theoretical and experimental work on the potential of all-optical signal processing for this specific on-chip application will be carried out.

The work will contribute to the larger scale project “3D Many-Core Architectures based on Optical Network-on-Chip” supported by the CominLabs excellence laboratory (<http://www.cominlabs.ueb.eu>) and bringing together experts in computer architectures, networks-on-chip, nanophotonic devices, and optical communication systems. This unique interdisciplinary research environment should lead to the generation of new on-chip network ideas and their proof-of-concept demonstrations.

Qualifications

Candidates should have a master degree in electronic engineering or photonics, preferably including documented qualifications in the areas of systems or devices for optical communications. The ideal profile would combine interest for experimental as well as modelling and simulation work. The successful candidate should be able to smoothly

integrate into the project team and to interact with project partners working in different scientific disciplines. Good communication skills in English are required.

About the FOTON Laboratory

The FOTON Laboratory is a research unit of the French National Centre for Scientific Research (CNRS) associated to University of Rennes 1 and the National Institute for Applied Sciences (INSA) of Rennes. FOTON is composed of two research teams: the Optoelectronics, Heteroepitaxy and Materials team, located in Rennes, and the Photonic Systems team located in Lannion, one of the strongholds of the French telecommunications industry. The two cities are located approximately 170 km apart, in the province of Brittany, Western France. Within the Photonic Systems team, the Lasers and Telecoms group is involved in research on optical communication systems, and in particular on the experimental demonstration of new functionalities that could potentially contribute to overcoming the challenges related to capacity, power consumption, cost and integration in optical tele- and data-communication systems as well as interconnects. The group has an established reputation in the area of all-optical signal processing. The activities of the Lasers and Telecoms group are supported by the well-equipped PERSYST experimental platform (<http://persyst.foton.cnrs.fr>).

The successful candidate will carry out research in the Lasers and Telecoms group based in Lannion. He will also interact with teams at the French Institute for Research in Computer Science and Automation (INRIA) and Lyon Nanotechnology Institute (INL). He will be expected to contribute to the development of the collaboration between FOTON and INL, and some research stays in Lyon will be arranged.

More information about FOTON can be found at: <http://foton.cnrs.fr>.

Further information

Further information may be obtained from Prof. Christophe Peucheret at: christophe.peucheret@univ-rennes1.fr.

Application procedure

Please submit your application at your earliest convenience by e-mail to: christophe.peucheret@univ-rennes1.fr.

The position will be filled as soon as a suitable candidate has been identified. Please clearly indicate the reference of the position in the subject field of your application e-mail.

Your application should include:

- Cover letter
- Detailed CV
- Copy of M.Sc. degree or equivalent
- Grade transcripts
- List of publications, if applicable
- Contact details of two references.

All qualified candidates are invited to apply.