

## **Call for applications - Postdoctoral Researcher**

Lyon Institute of Nanotechnology <http://inl.cnrs.fr>  
Ecole Centrale de Lyon, 36 av. Guy de Collongue,  
F-69134 Ecully, FRANCE



---

### **Modeling and design methods for Photonics on CMOS**

---

Photonics on CMOS, the heterogeneous co-integration of photonic and electronic devices in a 3D integrated circuit, will enable high system functionality and performance, using extensions to conventional microelectronics fabrication processes and enabling a shift to architectural innovation. However, among the many issues to be addressed to bring Photonics on CMOS to a mature industrial level, photonics integration must be straightforward for IC designers. This implies that the creation of design tools and libraries for photonic devices, compatible with conventional EDA flows, is mandatory.

While such a flow does not exist today, proof of concept or functional demonstrations of hierarchical models for major building blocks have been made in previous research projects (laser, modulator, waveguides and resonators, detector, coupling, and network). As an example, the FP6 project PICMOS demonstrated the simulation and synthesis of a full optical link on a chip. However, even though the results obtained were considered to be a major breakthrough, significant efforts are still needed to improve the design tool performance in terms of abstraction, accuracy and speed.

In the framework of a European project (FP7-ICT IP HELIOS) and with partners such as IMEC, CEA-LETI and Phoenix BV, the Heterogeneous Systems Design group at INL aims to develop novel EDA-compatible modeling and design methods for photonics devices and assess their suitability for simulating or designing heterogeneous systems with photonics/electronics convergence. In this context we are currently looking for a (m/f) **Postdoctoral Researcher** for a **2 year** contract.

#### **Job description**

Within the HELIOS project you will be expected to:

- define a coherent design methodology and flow for the integration of photonics on CMOS, and develop an interface strategy for the integration of photonic design tools with EDA tools
- define a hierarchical modeling strategy compatible with both electromagnetic simulation and EDA abstraction levels, and build model libraries of photonic devices and circuits
- demonstrate the specification and accurate validation of systems containing photonics and CMOS with the developed approach

As a senior member of a team set up to work on this topic with the support of several sources of funding at national and European level, you will also be expected to supervise MSc students.

#### **Profile**

You have a PhD in Electronic Engineering / Computer Science / Physics and have worked closely in at least one of the following areas: design methodologies, multi-disciplinary or system-level modeling, electromagnetic simulation. Knowledge of Matlab, Verilog-A, elementary optical device physics is a plus. Fluency in French is also a plus but is not mandatory.

#### **About INL**

INL is a 200-strong research institute based in Lyon, France, carrying out fundamental and applied research in electronics, semiconductor materials, photonics and biotechnologies. We have achieved worldwide recognition for pioneering work in the area of integrated optical interconnect. Recent highlights include simulation-based quantitative comparisons of electrical to optical interconnects at the physical link level and the development of the world's first demonstration of a working optical link on a CMOS wafer.

#### **Send CV and statement of purpose (in English or French) to**

Ian O'Connor  
INL-Lyon Institute of Nanotechnology  
Site Ecole Centrale de Lyon  
36 avenue Guy de Collongue, F-69134 Ecully  
France  
Tel: +33 472 186054  
Email: [ian.oconnor@ec-lyon.fr](mailto:ian.oconnor@ec-lyon.fr)