



PhD in FISICA / PHYSICS - 38th cycle

PARTENARIATO PNRR Research Field: DEVELOPMENT OF INTEGRATED QUANTUM PHOTONIC PROCESSORS

Monthly net income of PhDscholarship (max 36 months)

€ 1200.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

Motivation and objectives of the research in this field

This research activity is part of the research project National Centre for HPC, Big Data and Quantum Computing – HPC (Centro Nazionale 01 – CN0000013) **CUP B93C22000620006**. The specific research activity of this PhD scholarship is part of a national effort to build a complete quantum photonic computer, and the PhD student will be involved in the design and fabrication of the quantum processing unit. This component will be fabricated in integrated photonics by femtosecond laser writing, a powerful technique where ultrashort laser pulses are used to locally modify the refractive index of transparent materials, thus allowing direct writing of integrated photonic circuits. In order to produce programmable processing units, active elements will also be introduced in the circuit. The produced processing units will then be embedded in a wider system including single photon sources and detectors to demonstrate new quantum algorithms.

Methods and techniques that will be developed and used to carry out the research

The activity will be carried out in the joint laboratories of IFNCR and Politecnico di Milano.

It includes the following subtasks:
i) photonic circuit design; ii) fabrication by femtosecond laser writing; iii) Characterization and calibration of the complete processing unit; iv) Development of more scalable circuit architectures; v) Development of complementary components as integrated quantum memories.



Educational objectives	The activity is highly multidisciplinary. The student will learn key concepts on photonic quantum computing, integrated photonic circuits, optical characterization, and laser micromachining.
Job opportunities	Academic; Research institutes; Start-ups; High-tech companies
Composition of the research group	1 Full Professors 2 Associated Professors 4 Assistant Professors 7 PhD Students
Name of the research directors	Roberto Osellame

Contacts
http://www.mi.ifn.cnr.it/site/ifnmilano/research/fsmicromachining/Integrated-quantum-optics roberto.osellame@polimi.it

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	600.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p>Educational activities</p> <p>Teaching assistantship: There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.</p>



Computer and desk availability: individual or shared use