



PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 41st cycle

Research Area n. 2 - Electronics

THEMATIC Research Field: INTEGRATED ELECTRONICS FOR AREA- AND POWER-EFFICIENT CONTROL OF RECONFIGURABLE PHOTONIC CIRCUITS

Monthly net income of PhDscholarship (max 36 months)

1400.0

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

The research aims to develop multichannel electronic integrated circuits for configuring and stabilizing programmable photonic chips. These are innovative components in the field of telecommunications that can implement signal processing algorithms directly in the optical domain. The scientific challenges lie in configuring the optical chip correctly and keeping its operation stable over time, and they can be tackled by coupling it with a custom electronic circuit. This approach enables system scalability in terms of area and power consumption, addressing two fundamental aspects towards industrial validation.

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

1) Design of an electronic integrated circuit for feedback control of photonic chips based on Mach-Zehnder interferometers; 2) experimental validation of the electronic-photonic prototype, demonstrating its use in free-space telecommunications and multimode fiber links; 3) design of a second electronic prototype able to simultaneously address photonic devices of different types, extending the range of application of the proposed feedback-based approach.

Educational objectives

The PhD candidate will develop a strong background in optoelectronics, with specific skills in the design of low-



	noise microelectronic circuits and digital signal processing. He/she is expected to acquire a strong attitude in conducting an independent research project, from the conception of an integrated circuit to the implementation of the full electro-optical system, the experimental validation and the dissemination of results.
Job opportunities	The broad applicability of the skills acquired during this research project will open career opportunities in the big international companies of semiconductor circuits as well as in companies more specifically oriented to the R&D of innovative optoelectronic systems. Moreover, the skills acquired in developing an entire electronic-phonic assembly also offer working opportunities in innovative startups.
Composition of the research group	1 Full Professors 1 Associated Professors 1 Assistant Professors 3 PhD Students
Name of the research directors	Dr. Francesco Zanetto, prof. Marco Sampietro

Contacts	
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marco.sampietro@polimi.it 0223996188	

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents	--

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<u>EDUCATIONAL ACTIVITIES</u> (purchase of study books and material, including computers, funding for participation in courses, summer schools, workshops and conferences).



TEACHING ASSISTANTSHIP: availability of funding in recognition of supporting teaching activities by the PhD student

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.

COMPUTER AVAILABILITY:

1st year: Yes

2nd year: Yes

3rd year: Yes

DESK AVAILABILITY:

1st year: Yes

2nd year: Yes

3rd year: Yes