POLITECNICO DI MILANO

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

Research Area n. 2 - Electronics

THEMATIC Research Field: MICROELECTRONIC CIRCUITS IN CMOS TECHNOLOGY FOR STABILIZATION AND CONTROL OF INTEGRATED OPTICAL INTERFEROMETRIC DEVICES

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	Integrated optical interferometric devices, such as ring resonators and Mach-Zehnder interferometers, enable the optical processing of both classical and quantum information with unmatched bandwidth and low power dissipation. However, these devices require precise tuning of their operating points and real-time stabilization to mitigate the effects of environmental changes. This research aims to develop innovative microelectronic circuits on a single chip that will stabilize and configure integrated photonic components. The goal is to design electronic circuits that control an interferometric device with a footprint smaller than the device itself, while maintaining low power dissipation, thereby providing a scalable solution for a large number of photonic devices.
Methods and techniques that will be developed and used to carry out the research	1) Design the analog circuits for the readout of optical sensors and the actuation of phase shifters; 2) develop the on-chip digital processor to implement the control law required by the photonic devices; 3) experimental validation of the designed chip coupled to a photonic circuit.
Educational objectives	The PhD candidate will develop a strong background in the design of mixed-signal integrated circuits, with a focus on specific skills in designing low-noise and low-power

	circuits. It is expected that he/she will acquire a strong attitude in conducting an independent research project, from conception to the experimental validation and the dissemination of results.
Job opportunities	The broad applicability of the skills acquired during this research project will open up career opportunities in international companies specializing in semiconductor circuits, as well as in companies focused on the R&D of innovative photonic systems. Moreover, the skills in developing an entire system on a chip also offer working opportunities in innovative startups and small to medium-sized enterprises.
Composition of the research group	1 Full Professors 1 Associated Professors 1 Assistant Professors 1 PhD Students
Name of the research directors	Prof. Giorgio Ferrari

Contacts
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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
EDUCATIONAL ACTIVITIES (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