Politecnico di Milano

PhD in
Information Technology
(Research Area n. 2 - ELECTRONICS)

Study and development of Application Specific Integrated Circuits (ASICs) for high resolution and high speed X and Gamma ray spectroscopy.

<table>
<thead>
<tr>
<th>Scholarships and Financial support</th>
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<tr>
<td>Monthly net income of PhD scholarship (max 36 months)</td>
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<td>Increase in the scholarship for stays abroad</td>
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<td>Number of scholarships</td>
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<tr>
<td>Beginning of PhD</td>
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<td>Deadline for application</td>
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Context of the research activity

Motivations and objectives of the research in this field

Many scientific and industrial applications will take benefit by advanced instrumentation for X and Gamma ray spectroscopic imaging able to operate at ultra high speed ($10^7$ phonons per second per mm$^2$). Such systems would need a readout electronics with exceptionally low noise and ultra fast response, nowadays unavailable. The main objective of the proposed research is to design, develop and characterize experimentally new CMOS ASICs for ultra fast readout of X-gamma ray spectroscopic detectors.
**Methods and techniques that will be developed and used to carry out the research**

The research activity will include all the phases related to the development of CMOS mixed-signal ASICs: from its conception to the design, simulation, fabrication (external foundry) till its full experimental characterization. The PhD student will participate to the phase of the ASIC implementation and test in the detection module of a ultra-fast X-gamma ray scanner.

**Educational objectives**

The PhD student will acquire skills in the design, simulation, layout and experimental tests of ASICs including analog and digital sections. Professional simulators and laboratory instrumentation will be used. Collaboration in team with other PhD students and with external national and international research groups will complete the training.

**Job opportunities**

At the end of the PhD the student will be ready to consider job opportunities both in companies requiring researchers or engineers skilled in mixed-signal CMOS integrated circuit design and/or in electronic instrumentation of in research institutions.

**Composition of the research group**

1 Associated Professor
1 Post-Doc
2 PhD students

**Names of the research directors**

Prof. Giuseppe Bertuccio

**Contacts**

Giuseppe.Bertuccio@polimi.it
Tel. +39 031.332.7346

**Additional support**

**Educational activities** (purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student per year

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<tr>
<th>Year</th>
<th>Amount</th>
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<tr>
<td>2nd</td>
<td>max 1540,00 euro per student</td>
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<tr>
<td>3rd</td>
<td>max 1540,00 euro per student</td>
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**Teaching assistanship:** 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: individual use
2nd year: individual use
3rd year: individual use

**Desk availability:**

1st year: individual use
2nd year: individual use
3rd year: individual use
Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other informations

The main Laboratory in which the research activity will be carried out is the “Semiconductor Devices and Integrated Circuit Labs” located Politecnico di Milano, Como Campus, Via Anzani 42, 22100 Como. Each PhD student will be assigned a personal desk and a PC in the laboratory.

List of Universities, Companies, Agencies and National or International Institutions that are cooperating in the research: XNEXT s.r.l. Milano (https://www.x-next.com/), CNR Istituto dei Materiali per l’Elettronica ed il Magnetismo (IMEM) Parma (https://www.imem.cnr.it/), Dipartimento di Fisica e Chimica dell’Università degli Studi di Palermo (http://www.unipa.it/dipartimenti/dific)

Within the collaboration with other research groups, meetings and laboratory sessions will be scheduled at: XNEXT-Milano, IMEM-Parma, DiFC-Palermo.

The PhD student will participate to national Workshops and to an International Conference to present the results of his work.

About the research Director prof. Giuseppe Bertuccio:

https://www.deib.polimi.it/ita/personale/dettagli/91650
https://www.deib.polimi.it/ita/notizie/dettagli/806