



# PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 37th cycle

Research Area n. 2 - Electronics

**THEMATIC Research Field: DESIGN OF COMPUTING-IN-MEMORY CIRCUITS WITH  
EMBEDDED RESISTIVE MEMORIES**

**Monthly net income of PhDscholarship (max 36 months)**

**€ 1300.0**

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**

Artificial intelligence (AI) is an enabling technology for virtually all economical, industrial and social aspects of our life and society. The purpose of this project is to enable AI at the edge (in a smart phone, a car, or a remote sensor in the environment) by hardware accelerators characterized by low energy consumption and high accuracy. The activity will consist of the design of integrated circuits for computing using embedded memory devices, such as phase change memory, magnetic memory or resistive switching memory. The circuits will enable fast, low-energy computing in a wide range of applications such as AI, machine learning, data analytics and cybersecurity.

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

**Educational objectives**

The doctorate activity will include attendance of academic courses, conferences, summer schools and workshops for the training of the student on the topics relevant for the research (clean room fabrication techniques, neuromorphic computing, device physics).

**Job opportunities**

The competence developed during the doctorate studies will enable access to job positions in device engineering and integrated circuit development.



<b>Composition of the research group</b>	1 Full Professors 0 Associated Professors 0 Assistant Professors 10 PhD Students
<b>Name of the research directors</b>	Daniele Ielmini

<b>Contacts</b>
daniele.ielmini@polimi.it phone 02 2399 6120 <a href="http://home.deib.polimi.it/ielmini/">http://home.deib.polimi.it/ielmini/</a>

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

<b>Scholarship Increase for a period abroad</b>	
<b>Amount monthly</b>	564.01 €
<b>By number of months</b>	6

<b>Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information</b>
<p>The PhD student will have access to a clean room facility after proper training. The PhD student will also have access to the electrical and numerical lab, where he/she will have a desk and a computer available for his/her research work.</p> <p>EDUCATIONAL ACTIVITIES (purchase of study books and material, including computers, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student per year 2nd year: euros per student (1534) 3rd year: euros per student (1534)</p> <p>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.</p> <p>COMPUTER AVAILABILITY: 1st year: individual use 2nd year: individual use 3rd year: individual use</p>



DESK AVAILABILITY:

1st year: individual use

2nd year: individual use

3rd year: individual use