



# PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 39th cycle

Research Area n. 2 - Electronics

**THEMATIC Research Field: PROGRAMMING ALGORITHMS OF NONVOLATILE MEMORIES  
FOR IN-MEMORY COMPUTING (ALGORITMI DI PROGRAMMAZIONE MEMORIE NON  
VOLATILI NEL CALCOLO IN MEMORIA)**

**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

<p><b>Motivation and objectives of the research in this field</b></p>	<p>A key issue with in-memory computing circuits is the requirement for high-precision memory devices to enable accurate on-chip machine learning. This project will aim at the development of programming algorithms for nonvolatile memory devices characterized by low energy consumption, fast execution and high precision.</p>
<p><b>Methods and techniques that will be developed and used to carry out the research</b></p>	<p>The activity will consist of the development of programming algorithms for nonvolatile memory devices, such as charge-trap memory and resistive switching memory. The algorithm include program, verify and bit slicing methodology. The algorithms will enable fast, precise and low-energy programming for accurate in-memory computing.</p>
<p><b>Educational objectives</b></p>	<p>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).</p>
<p><b>Job opportunities</b></p>	<p>The competence developed during the doctorate studies will enable access to job positions in device engineering and integrated circuit development.</p>



	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>	Prof. Daniele Ielmini

<b>Contacts</b>	
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<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>	700.0 €
<b>By number of months</b>	6

<b>Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information</b>
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 to carry out the research project.