



# PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 38th cycle

Research Area n. 2 - Electronics

**THEMATIC Research Field: LOW-NOISE MULTICHANNEL ELECTRONICS FOR FAST  
COHERENT RAMAN IMAGING**

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

**€ 1250.0**

In case of a change of the welfare rates during the three-year period, the amount could be modified.

## Context of the research activity

|                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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| <p><b>Motivation and objectives of the research in this field</b></p>                          | <p>Coherent Raman Microscopy (CRM) is a powerful technique for performing a detailed molecular analysis of biological samples. This research aims to develop an electronic platform for high-speed acquisition and analysis of Raman spectra, enabling video-rate imaging in the richly informative fingerprint region. The research activity will be part of the European project CRIMSON (<a href="https://www.crimson-project.eu/">https://www.crimson-project.eu/</a>).</p> |
| <p><b>Methods and techniques that will be developed and used to carry out the research</b></p> | <p>1) Design custom integrated circuits for the amplification in parallel of multiple Raman signals; 2) develop an FPGA-based platform for real-time acquisition and analysis of the data; 3) experimental validation of the final broadband coherent Raman microscope.</p>                                                                                                                                                                                                     |
| <p><b>Educational objectives</b></p>                                                           | <p>The PhD candidate will develop a strong background in designing electronic systems with specific skills in low-noise electronics and FPGA-based real-time digital processing. It is expected that he/she will become able to conduct an independent research project, from the conception to the experimental validation and writing of results for publication.</p>                                                                                                         |
| <p><b>Job opportunities</b></p>                                                                | <p>The broad applicability of the skills acquired during this research project will give the opportunity for a career in</p>                                                                                                                                                                                                                                                                                                                                                    |



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|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                          | industrial companies oriented to the R&D of innovative electronic systems. Moreover, the skills in developing an entire instrument also offer an opportunity for working in innovative startup companies. |
| <b>Composition of the research group</b> | 1 Full Professors<br>2 Associated Professors<br>0 Assistant Professors<br>5 PhD Students                                                                                                                  |
| <b>Name of the research directors</b>    | Giorgio Ferrari, Dario Polli                                                                                                                                                                              |

| <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>                           | 625.0 € |
| <b>By number of months</b>                      | 6       |

| <b>Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| <p>The PhD will be co-supervised by the Innovative Integrated Instrumentation for the Nanoscience laboratory (I3N Lab) of the Electronics, Information and Bioengineering department and by the VIBRA team at the Physics department of the Politecnico di Milano. The PhD candidate will be asked to contribute to the MSs students' supervision and collaborate with both teams.</p> <p>LIST OF UNIVERSITIES, COMPANIES, AGENCIES AND/OR NATIONAL OR INTERNATIONAL INSTITUTIONS THAT ARE COOPERATING IN THE RESEARCH: 1. Cambridge Raman Imaging Ltd. (CRI), <a href="https://www.cambridgeramanimaging.com/">https://www.cambridgeramanimaging.com/</a>; 2. AFS - Active Fiber Sustrms (Jena, Germany); 3. 3rd Place (Italy) and DATRIX (Italy); 4. LightCore technology (France)</p> <p>EDUCATIONAL ACTIVITIES (purchase of study books and material, including computers, funding for participation in courses, summer schools, workshops and conferences): financial aid</p> |



per PhD student

5.095,96 Euro per student

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: individual use

DESK AVAILABILITY: individual use