



# PhD in FISICA / PHYSICS - 38th cycle

**THEMATIC Research Field: MULTISCALE, HIGH RESOLUTION TRANSIENT ABSORPTION SPECTROSCOPY**

<b>Monthly net income of PhDscholarship (max 36 months)</b>
<b>€ 1195.5</b>
In case of a change of the welfare rates during the three-year period, the amount could be modified.

<b>Context of the research activity</b>	
<b>Motivation and objectives of the research in this field</b>	<p>This fellowship will be in the context of the iPHOQS project, a large-scale Italian Research Infrastructure in the field of photonics and quantum science. One of the goals of iPHOQS is to develop a set of experimental apparatuses for multi-scale, multidimensional time-resolved optical spectroscopy, with a worldwide unique combination of capabilities, such as temporal resolution, sensitivity, temporal and spectral coverage, excitation frequency resolution and spatio-temporal resolution. The scholar will work on the development of a transient absorption (TA) spectroscopy workstation combining very high temporal resolution (with sub-10-fs pump and probe pulses independently tunable from the infrared to the ultraviolet) and extended temporal coverage (out to 10-3 s).</p>
<b>Methods and techniques that will be developed and used to carry out the research</b>	<p>The scholar will develop a TA workstation with the following characteristics:</p> <ul style="list-style-type: none"> <li>i) High temporal resolution, using few-optical-cycle pulses generated by ultra-broadband optical parametric amplifiers followed by dispersion compensation to generate sub-10-fs pulses tunable from the infrared to the ultraviolet. The availability of such short pulses will enable the study of the so-called ‘primary processes’ occurring on the sub-100-fs timescale, such as energy and charge transfer, electron-electron scattering, exciton formation and relaxation, or coherent lattice or molecular vibrations.</li> <li>ii) Wide temporal coverage, using synchronized laser</li> </ul>



	<p>systems to cover seamlessly almost 10 orders of magnitude in pump-probe delay, from 10<sup>-13</sup> s to 10<sup>-3</sup> s. This capability will enable the study of processes occurring over a broad range of timescales, such as ligand rebinding in proteins and charge recombination dynamics in photovoltaic materials and devices.</p>
<b>Educational objectives</b>	<p>The scholar will receive a multidisciplinary training in topics including nonlinear optics, ultrafast spectroscopy and condensed matter physics. He/she will have the opportunity to visit partner laboratories in the iPHOQS project.</p>
<b>Job opportunities</b>	<p>Due to the multidisciplinary training in cutting edge techniques of optics and photonics as well as solid-state physics and nanoscience, the scholar will have excellent job opportunities in high-tech industries. In addition, he/she will be well positioned for an academic career.</p>
<b>Composition of the research group</b>	<p>1 Full Professors 3 Associated Professors 2 Assistant Professors 5 PhD Students</p>
<b>Name of the research directors</b>	<p>Giulio Cerullo</p>

<b>Contacts</b>	
<p>giulio.cerullo@polimi.it +39-02-23996164 <a href="https://www.fisi.polimi.it/en/people/cerullo">https://www.fisi.polimi.it/en/people/cerullo</a>  <a href="https://www.femtosecond.fisi.polimi.it/">https://www.femtosecond.fisi.polimi.it/</a></p>	

<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>	--



Scholarship Increase for a period abroad	
Amount monthly	597.75 €
By number of months	6

**Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information**

**Educational activities:**

Educational activities (purchase of study books and material, funding for participation to courses, summer schools, workshops and conferences): financial aid per PhD student per 3 years: max 4.872,90 euros.

**Teaching assistantship:**

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:** shared use