



PhD in FISICA / PHYSICS - 38th cycle

PNRR_351_DOTT_RICERCA Research Field: NONLINEAR OPTICAL SPECTROSCOPY OF (BIO)-MOLECULES AND NANOMATERIALS

Monthly net income of PhDscholarship (max 36 months)

€ 1200.0

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

Ultrafast and nonlinear optical spectroscopy techniques use sequences of coherent, ultrashort light pulses to study photoinduced dynamical processes in atoms, molecules, nanostructures, and solids. This highly multidisciplinary field of research has experienced an impetuous growth in recent years, due to the technological progress and to the development of sophisticated spectroscopic techniques exploited at the frontier between physics, chemistry and biology. The Physics Department at Politecnico di Milano possesses several sophisticated experimental setups for laser spectroscopy, which will be further developed and applied by the scholar, in a broad network of international collaborations with both academic and industrial research centers. Ultrafast optical spectroscopy has numerous applications of great societal relevance, such as in the green transition (e.g. development of organic and hybrid photovoltaic/photocatalytic systems) and in health (e.g. understanding of photoprotection mechanisms in DNA).

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

The fellow will work on the application of sophisticated ultrafast and nonlinear spectroscopy techniques (such as transient absorption and coherent Raman spectroscopy) to the study of cutting-edge problems in condensed matter physics and biochemistry. The investigated problems will range from fundamental studies of biochemical processes, such as photosynthesis and photoprotection, to the understanding of carrier dynamics in quantum-confined low-dimensional systems and charge separation and transport in photovoltaic and photocatalytic devices.



Educational objectives	The scholar will receive a multidisciplinary training in topics including nonlinear optics, ultrafast and precision spectroscopy and condensed matter physics. He/she will have the opportunity to visit partner laboratories in Italy and abroad.
Job opportunities	Due to the multidisciplinary training in cutting edge techniques of optics and photonics as well as nanoscience and physical chemistry of (bio)-molecules, the scholar will have excellent job opportunities in high-tech industries. In addition, he/she will be well positioned for an academic career.
Composition of the research group	1 Full Professors 3 Associated Professors 2 Assistant Professors 5 PhD Students
Name of the research directors	Giulio Cerullo

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

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	Not applicable
By number of months at the company	0
Institution or company where the candidate will spend the period abroad (name and brief description)	Description of the foreign partner for secondment



By number of months abroad	6
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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 4.892,40 euros per student.

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