



PhD in FISICA / PHYSICS - 41st cycle

THEMATIC Research Field: ENGINEERING RADIATIVE HEAT EMISSION WITH TIME-VARYING MEDIA

Monthly net income of PhDscholarship (max 36 months)

1600.0

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

The research is funded by the ERC-StGProject TREAT (GA n. 101162914), developed at IFN-CNR. Thermal radiation is an essential mechanism for energy and entropy transport, influencing various aspects of science and engineering. However, due to its stochastic nature—it is characterized by a broadband spectrum, lack of polarization, and directionality, limiting its control and manipulation. TREAT aims to address these challenges by introducing a method to engineer radiative heat transport with dynamic control over the spectrum and momentum of thermal radiation. The Ph.D. program focuses on investigating the engineering of thermal emission by temporal modulation of the dielectric permittivity of selected infrared heat emitters and by density of state engineering exploiting the near-field coupling of thermal radiation to hyperbolic media.

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

The student will work on the development of transient absorption spectroscopy setups in the mid-infrared and terahertz range and at the development of a far-field thermal microscope with k-space sampling capability. Moreover, the student will gain experience with near-field nanoimaging based on ultrafast sources coupled to a s-SNOM.

Educational objectives

The scholar will receive multidisciplinary training in infrared photonics, ultrafast spectroscopy, near-field imaging and condensed matter physics. They will learn how to develop and use advanced spectroscopy setups and



	study thermal radiation engineering via density of state control and reciprocity breaking.
Job opportunities	The scholar will have excellent job opportunities in high-tech industries related to optics, photonics, solid state physics and nanoscience. In addition, he/she will be well positioned for an academic career.
Composition of the research group	2 Full Professors 1 Associated Professors 1 Assistant Professors 2 PhD Students
Name of the research directors	Dr. Eva Pogna

Contacts	
Dr. Eva Pogna, Senior Researcher CNR-IFN	
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents	--

Scholarship Increase for a period abroad	
Amount monthly	800.0 €
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 6.522 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	



Other information: The student will have the possibility to interact with research groups of both CNR-IFN and Politecnico di Milano: including the groups of Prof. Giulio Cerullo (<https://www.femtosecond.fisi.polimi.it>) and of Dr. Vozzi, and Prof. Stagira (<https://www.udyni.eu>).