



PhD in FISICA / PHYSICS - 38th cycle

PARTENARIATO PNRR Research Field: TIME-RESOLVED POLARIZATION MICROSCOPY FOR MAGNONICS

Monthly net income of PhDscholarship (max 36 months)

€ 1350.0

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 PhD student will carry out a research work in the framework of the "Nano foundries and fine analysis - digital infrastructure (NFFA-DI)" project [area ESFRI "Physical Science and Engineering" (cod.IR0000015)].

The main objective of the PhD will be threefold:

- to develop an experimental setup for performing Time-Resolved Polarization Microscopy (in particular Magneto-Optical Kerr Effect), and demonstrate it's use for measuring with high spatial and temporal resolution the propagation of spin-waves in technologically relevant materials, within the framework of Magnonics.
- To map the temporal evolution of the magnetization during spin-wave propagation in ferromagnetic and ferrimagnetic thin films such as CoFeB, YIG, NiFe.
- To actively participate in experiments exploiting the TR-polarization microscope proposed by users of the NFFA-DI infrastructure.

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

The Ph.D. candidate will carry out the following activities:

- Commissioning and optimization of the time resolved polarization microscope setup. In particular the Ph.D. student will actively participate in the development, and



	<p>optimization of the setup, and test it for time resolved MOKE (TR-MOKE) experiments with standard magnetic samples.</p> <ul style="list-style-type: none"> - Nanoscale and bulk magnetic characterization by employing several complementary magnetic measurements techniques such as Magnetic Force Microscopy, Static Kerr Microscopy, Vibrating Sample Magnetometry -FMR and broadband spectroscopy exploiting a new RF station installed within the NFFA-DSI project. -Study of the spin-wave properties in magnetic thin films and nanostructures via micromagnetic simulations properties, and comparison with the experimental data acquired via TR-MOKE -Design and fabrication of magnonic devices via micro-nanofabrication techniques available at PoliFab, such as optical/EBEAM lithography.
Educational objectives	<ul style="list-style-type: none"> - Development of a deep hands-on knowledge on lasers, optical setups, electromagnets, advanced control softwares -Theoretical/Experimental knowledge in the field of experimental nanomagnetism and spin dynamics. - Expertise in the use of finite-elements-methods modeling for magnetism. - Knowledge in the use of micro-nanofabrication techniques for the realization of nanoscale and radio-frequency devices.
Job opportunities	<p>The work will be carried out at the laboratories of the Physics Department of Politecnico di Milano, and at PoliFab, the micro-nano fabrication facility of Politecnico di Milano.</p> <p>The broad know-how acquired during the Ph.D. will give the student a solid basis for future carrier development as Post-doc in academia both in Italy and abroad.</p> <p>The profile of the PhD candidate will allow them to R&D positions in companies, universities and research centers in Italy and abroad. Managerial positions in the field of innovation and technology.</p>
Composition of the research group	<p>1 Full Professors 2 Associated Professors</p>



	1 Assistant Professors 3 PhD Students
Name of the research directors	Bertacco-Petti-Albisetti

Contacts	
http://nabis.fisi.polimi.it PhyND group: https://phynd.polimi.it/ In collaboration with the staff of Polifab: http://www.polifab.polimi.it riccardo.bertacco@polimi.it tel. 0039 02 2399 9663; https://www.fisi.polimi.it/en/people/bertacco	

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	675.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p>Educational activities per year : 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 5.300,25 euros per student.</p> <p>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.</p> <p>Computer availability: individual use Desk availability: individual use</p>