



## PhD in FISICA / PHYSICS - 40th cycle

### THEMATIC Research Field: NANOSTRUCTURED QUANTUM MATERIALS FOR ELECTRONICS AND SPINTRONICS

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

**€ 1400.0**

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

Nanostructured materials allow to control and study novel effects in condensed matter. In this context, developing novel methodologies for crafting and studying the magnetic and transport properties of materials is crucial. The research aims to use advanced nanostructuring methodologies such as phase nanoengineering, for controlling the electronic and magnetic properties in thin film materials, with nanoscale spatial resolution and three-dimensional capability. The final goal will be the realization of novel platforms for unconventional neuromorphic or quantum computing platforms. The research activity is part of the project FARE Ricerca in Italia title "NAMASTE-NANostructuring MAGnetism in crySTalline matERials" n. R20FC3PX8R – CUP D43C22004040001, funded by MUR.

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

Growth of thin film multilayer structures via magnetron sputtering. Nanoscale surface characterization of the morphology, electric and magnetic properties via Scanning Probe Microscopy. Conventional Nanofabrication techniques, e.g. optical lithography, e-beam lithography, ion milling. Advanced Nanofabrication via thermal scanning probe lithography. Magnetic characterization via Kerr microscopy, vibrating sample magnetometer and synchrotron-based techniques. Electronic transport measurements: Magnetoconductance, Hall measurements. Cryogenic transport measurements in cryostat. Numerical methods: Micromagnetic simulations and Finite Elements Method



	simulation of electronic and thermal transport.
<b>Educational objectives</b>	Understanding of electronic transport and magnetism in nanostructured materials. Training in cleanroom techniques, nanoscale measurements, transport measurements and micro-nanofabrication methods. Participation and presentation in local and international workshops and conferences. Writing of scientific articles and proposals.
<b>Job opportunities</b>	Post-doc opportunities in academia both in Italy and abroad. R&D positions in companies, universities and research centers in Italy and abroad. Managerial positions in the field of innovation and technology.
<b>Composition of the research group</b>	0 Full Professors 2 Associated Professors 2 Assistant Professors 5 PhD Students
<b>Name of the research directors</b>	Edoardo Albisetti; Daniela Petti

Contacts	
Edoardo.albisetti@polimi.it Daniela.petti@polimi.it  PhyND group. <a href="https://phynd.polimi.it/">https://phynd.polimi.it/</a>	

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

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information	
<b>Educational activities:</b> 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: 5707,20 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 and desk availability:** individual use computer and desk.