



PhD in FISICA / PHYSICS - 39th cycle

**PNRR 118 PC Research Field: ENHANCEMENT WITH MODERN INVESTIGATION
TECHNIQUES OF THE MATERIAL CONSERVED IN THE GALLONE ARCHIVE**

Monthly net income of PhDscholarship (max 36 months)

€ 1195.5

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 Gallone archive located in the Physics Department of the Milan Polytechnic constitutes a vast and precious collection of samples (over 10,000) taken over the course of several decades of activity by Dr. Antonietta Gallone. These samples, mainly from Italian pictorial works, cover a broad historical period and authors of great importance starting with the vast collection of samples (over 400) from Leonardo's Last Supper, passing through most of the great artists who have made the history of the art of our country. Years of cataloging work was carried out on this enormous amount of material, and it can now be said that the archive is easily accessible to scholars. Studies were carried out on these works from the 1970s to the early 2000s and the techniques used were mainly optical microscopy, electron microscopy with X microprobe and UV fluorescence. Thanks to these techniques, results of great interest to art historians and restorers were obtained in the past. In the meantime, investigation techniques have undergone constant and significant technological progress which has led to the strengthening of existing ones and the birth of completely new techniques. The purpose of this doctorate is to use the immense amount of material available to select some topics of interest on which to carry out new investigations by making use of the investigation techniques currently available, exploiting the state of the art of those already used in the past and the new ones or never used before.

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

The purpose of this doctorate is to use the immense



<p>research</p>	<p>amount of material available to select some topics of interest on which to carry out new investigations by making use of the investigation techniques currently available, exploiting the state of the art of those already used in the past and the new ones or never used before.</p> <p>Considering the amount of material available, the first step will consist in selecting some themes of particular historical-artistic interest and this will be done in close collaboration with art history experts. From this point of view it should be noted that the reorganization of the archive and the cataloging of the material preserved in it was carried out precisely by experts in this field who will continue to guarantee their collaboration in the future.</p> <p>Once the topics of interest have been identified, measurement campaigns will be launched using techniques already used in the past such as optical microscopy and electron microscopy with microprobes. To these will be added other investigations carried out with techniques that have greatly evolved over the years, becoming routine tools in the field of cultural heritage. Among these it is worth mentioning Raman spectroscopy and synchrotron light. For both, collaborations are already underway with other groups of the Milan Polytechnic and with ESRF, the European synchrotron in Grenoble. The intention is to continue and enhance these collaborations.</p> <p>Part of the activity will be carried out at Cinel SpA where the candidate will deepen his knowledge in the design and construction of instrumentation to be installed at large scale facilities such as synchrotron light sources.</p>
<p>Educational objectives</p>	<p>The PhD project will bring the candidate to the frontiers of research in the two following topics:</p> <ul style="list-style-type: none"> - Use of investigation techniques available on campus such as optical and electron microscopy and Raman spectroscopy in the field of cultural heritage. Use of techniques available in large international facilities such as synchrotron light sources. He/she will also become an expert of the use of the above techniques by exploiting the possibility to interpret the obtained results working in team with experts both in the use and development of these techniques but also of art historians.



Job opportunities	Due to the multidisciplinary training in optics, photonics and spectroscopy, the scholar will have excellent job opportunities in different types of companies and startups, including those designing optical systems and those developing spectroscopy and imaging spectroscopy systems. In addition, he/she will be well positioned for a possible career in university or research center.
Composition of the research group	1 Full Professors 2 Associated Professors 2 Assistant Professors 2 PhD Students
Name of the research directors	Ezio Puppini

Contacts
Prof. Ezio Puppini: ezio.puppini@polimi.it

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	597.75 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	ESRF – European Synchrotron Radiation Facility
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	He/she will carry out a 6-months minimum secondment activity in an EU-located research group active in the development of cutting-edge mobile imaging instruments for remote sensing applications.
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p>Educational activities:?</p> <p>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 per student.</p> <p>Teaching assistantship:</p> <p>There are various forms of financial aid for activities of support to the teaching practice. The PhD</p>



student is encouraged to take part in these activities, within the limits allowed by the regulations.

Computer and Desk availability:

individual or shared use