



# PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 39th cycle

**THEMATIC Research Field: OPTOMECHANICAL DESIGN OF ASTRONOMICAL  
INSTRUMENTATION FOR THE EXTREMELY LARGE TELESCOPE**

<b>Monthly net income of PhDscholarship (max 36 months)</b>
<b>€ 1400.0</b>
In case of a change of the welfare rates during the three-year period, the amount could be modified.

<b>Context of the research activity</b>	
<b>Motivation and objectives of the research in this field</b>	<p>The new generation of ground-based telescopes, in particular the Extremely Large Telescope currently under construction, is imposing to the Astronomical instrumentation new challenges and different criticalities with respect to traditional systems. Developing the opto-mechanical design of the instruments for Astrophysical research for these complex structures imply a multidisciplinary approach that will merge thermomechanical design, cryogenic technology, measurement and automation.</p>
<b>Methods and techniques that will be developed and used to carry out the research</b>	<p>The feasibility studies will be based on the numerical and/or analytical modeling of the thermomechanical systems to predict the optical performances of the system under the expected operational conditions. Experimental validation of the numerical models, by designing and performing specific mechanical, thermal and optical tests on breadboards of components or subsystems will be run in parallel. The laboratories of the Mechanical Engineering Department and of INAF-Osservatorio di Brera will be fully available at that purpose.</p>
<b>Educational objectives</b>	<p>The main educational objectives are the development of innovative opto-mechanical knowledge with a learning by doing approach thanks to the inclusion in a multidisciplinary team performing the mechanical design of an instrument conceived for the Extremely Large</p>



	Telescope. The developed knowledges include base optical systems design, advanced thermomechanical design and testing techniques. The candidate will also develop basic knowledge of optical raytracing.
<b>Job opportunities</b>	<p>Job opportunities are in the R&amp;D departments of industries operating in precision mechanics, in research institutions laboratories working with optical, vacuum and cryogenic systems.</p> <p>Institutions that are cooperating in the research are INAF - Osservatorio Astronomico di Brera and ESO - European Southern Observatory.</p>
<b>Composition of the research group</b>	<p>1 Full Professors  3 Associated Professors  0 Assistant Professors  2 PhD Students</p>
<b>Name of the research directors</b>	Prof. Bortolino Saggin, Simone Cinquemani

#### Contacts

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For questions about scholarship/support please contact [phd-dmec@polimi.it](mailto:phd-dmec@polimi.it)

#### Additional support - Financial aid per PhD student per year (gross amount)

<b>Housing - Foreign Students</b>	--
<b>Housing - Out-of-town residents (more than 80Km out of Milano)</b>	--

#### Scholarship Increase for a period abroad

<b>Amount monthly</b>	700.0 €
<b>By number of months</b>	6

#### **Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information**

Financial aid is available for all PhD candidates (purchase of study books and materials, funding for participation in courses, summer schools, workshops and conferences) for a total amount of euro 5.707,13.

Our candidates are strongly encouraged to spend a research period abroad, joining high-level research groups in the specific PhD research topic, selected in agreement with the Supervisor.



An increase in the scholarship will be applied for periods up to 6 months (approx. 700 euro/month - net amount).

Teaching assistantship: availability of funding in recognition of supporting teaching activities by the PhD candidate. 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.