



# PhD in INGEGNERIA STRUTTURALE, SISMICA, GEOTECNICA / STRUCTURAL SEISMIC AND GEOTECHNICAL ENGINEERING - 38th cycle

**PNRR\_352 Research Field: ADVANCED NUMERICAL SIMULATION OF NONLINEAR  
PHENOMENA IN MEMS**

<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>	
<p><b>Motivation and objectives of the research in this field</b></p>	<p>Microsystems or Micro Electro Mechanical Systems (MEMS) are highly sophisticated devices, where electronics is coupled with mechanical parts to create micro sensors, micro actuators, as well as micro-fluidic devices. MEMS are today commonly used in automotive, aerospace and consumer-oriented engineering. Other fields are now taking advantage of these devices, like biomedical engineering and structural engineering, where MEMS start being used for monitoring and self-actuation. Multi-disciplinary research is strongly needed to improve the performances and reliability of MEMS and to create new devices which will enable the Internet of Things and Industry 4.0 revolutions. As such, the project supports several missions of PNRR among which M1C2 and M4C2. The focus of the project is developing new modelling strategies for MEMS research, in particular for model order reduction of nonlinear problems.</p>
<p><b>Methods and techniques that will be developed and used to carry out the research</b></p>	<p>MEMS-oriented research needs a highly multi-disciplinary approach and a deep knowledge of the fundamentals of physics, mechanics and electronics, as well as a certain familiarity with today's sophisticated techniques for numerical modelling and simulations. The proposed research project is related to the Joint Research Center</p>



	between Politecnico di Milano and STMicroelectronics "Research Center on Sensor systems with Advanced Materials - STEAM".
<b>Educational objectives</b>	The candidate will have the opportunity to collaborate with various Departments and research groups of Politecnico di Milano. A strict collaboration with the industrial partner STMicroelectronics will also characterize the PhD experience of the candidate who will acquire specialized knowledge on MEMS and their related research fields, like micromechanics and microfabrication.
<b>Job opportunities</b>	Direct employment in MEMS- and NEMS-research centers and industries in Europe and all-over the world. Job opportunities in other fields, where experts in Multiphysics problems, micro-mechanics, testing and computational methods, advanced structural monitoring are requested.
<b>Composition of the research group</b>	3 Full Professors 3 Associated Professors 3 Assistant Professors 6 PhD Students
<b>Name of the research directors</b>	Attilio Frangi, Alberto Corigliano

<b>Contacts</b>	
<p>Attilio Frangi: attilio.frangi@polimi.it tel. +39 02 2399 4213</p> <p>Alberto Corigliano: alberto.corigliano@polimi.it tel. +39 02 2399 4244</p> <p>www.dica.polimi.it www.mems.polimi.it</p>	

<b>Additional support - Financial aid per PhD student per year (gross amount)</b>	
<b>Housing - Foreign Students</b>	--
<b>Housing - Out-of-town residents (more than 80Km out of Milano)</b>	--



Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	STMicroelectronics - www.st.com
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	to be defined
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p>Universities, Companies, Agencies and/or National or International Institutions that are cooperating in the research:</p> <ul style="list-style-type: none"> <li>• STMicroelectronics - www.st.com</li> <li>• Prof. Cyril Touze, ENSTA, Paris</li> <li>• Prof. Gaetan Kerschen, Univ Liège</li> <li>• Prof. Nathan Kutz and David Brunton, Univ Washington, Seattle</li> </ul> <p><u>Educational activities</u> (purchase of study books and material, funding for participation to courses, summer schools, workshops and conferences): The Ph.D. course supports the educational activities of its Ph.D. students with an additional funding equal to 10% of the scholarship, starting from the first year.</p> <p><u>Teaching assistantship</u> (availability of funding in recognition of support to teaching activities by the PhD student): Ph.D. students are encouraged to apply, upon prior authorization, to the calls to support teaching activities at the undergraduate and Master levels at Politecnico, being paid for that. The teaching assistantship will be limited up to about 80 hours, maximum half of them devoted to teaching and classroom activities and the rest to support classworks and exams.</p> <p><u>Computer availability and desk availability</u>: Each Ph.D. student has his/her own computer for individual use. Each Ph.D. student has his/her own desk, cabinet and locker.</p>