

# MANAGEMENT AND PRODUCTION ENGINEERING

## INRiM - Advanced Metrology for Mechanical Engineering

<b>Funded By</b>	I.N.R.I.M. - ISTITUTO NAZIONALE DI RICERCA METROLOGICA [Piva/CF:09261710017]
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<b>Context of the research activity</b>	<p>This Thematic Grant includes 4 research Topics (listed below), with a specific title and proponent Supervisor/s. The applicants have the possibility to identify the specific topic they are interested in. The research activity will be carried out in Turin.</p> <p>Topic 1: Development of force primary standards in the nano and micro ranges Topic 2: Traceability for indentation measurements in Brinell, Vickers and Knoop hardness Topic 3: Development of certified reference materials of CO<sub>2</sub> gas mixtures characterized for the isotopic composition Topic 4: Mechanical measurements for space missions</p> <p>For more details about the Topics, visit: <a href="https://www.inrim.it/en/services/training/early-career-metrology/phd-scholarships">https://www.inrim.it/en/services/training/early-career-metrology/phd-scholarships</a></p> <p>Contacts: Topic 1: Andrea Prato (A.PRATO@INRIM.IT) Topic 2: Andrea Prato (A.PRATO@INRIM.IT) Topic 3: Francesca Durbiano (FDURBIANO@INRIM.IT) Topic 4: Carlo Sasso (C.SASSO@INRIM.IT)</p> <p>Supervisors: Topic 1: Maurizio Galetto Topic 2: Maurizio Galetto Topic 3: Massimo Santarelli Topic 4: TBD</p>
	Topic 1: This proposal aims to develop micro- and nano-force standards for

<b>Objectives</b>	<p>force traceability in MEMS, nanotech, and medical devices, addressing surface effects, uncertainties, and computational modeling.</p> <p>Topic 2: This PhD research aims to standardize hardness testing by analyzing 3D indentations, influencing factors, modeling, and automation to improve accuracy, traceability, and global standardization.</p> <p>Topic 3: Preparation of CO<sub>2</sub> gas mixtures following the International Standards ISO6142-1 and ISO17034. Isotopic composition determination by CRDS and FTIR spectroscopies. Evaluation of measurement uncertainty.</p> <p>Topic 4: Space missions rely on several optical and mechanical measurements. The Ph.D will develop interferometric measurements for space application and contribute to a ground test facility for LISA mission.</p>
<b>Skills and competencies for the development of the activity</b>	<p>Topic 1: Skills in mechanical measurements, measurement uncertainty assessment, Finite Element Method (FEM) programs, Matlab and LabVIEW development environment are appreciated, but not mandatory.</p> <p>Topic 2: Skills on mechanical measurements, measurement uncertainty assessment, Finite Element Method (FEM) programs, Matlab and LabVIEW development environment are appreciated, but not mandatory.</p> <p>Topic 3: Solid background in analytical chemistry, spectroscopic techniques and basic knowledge in metrology.</p> <p>Topic 4: Physics: Classical mechanics, Optics, electromagnetism. Simple analog electronics; Programming languages and tools as Labview, Python, Wolfram Mathematica and/or MathLab. English speaking and writing.</p>