MANAGEMENT AND PRODUCTION ENGINEERING

INRiM - Advanced Metrology for Mechanical Engineering (2)

Funded By	I.N.RI.M. - ISTITUTO NAZIONALE DI RICERCA METROLOGICA [P.iva/CF:09261710017]

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Context of the research activity	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. 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 CO2 gas mixtures characterized for the isotopic composition Topic 4: Mechanical measurements for space missions For more details about the Topics, visit: https://www.inrim.it/en/services/training/early-career-metrology/phd-scholarships Contacts: Topic 1: Andrea Prato (A.PRATO@INRIM.IT) Topic 2: Andrea Prato (A.PRATO@INRIM.IT) Topic 3: Francesca Durbiano (F.DURBIANO@INRIM.IT) Topic 4: Carlo Sasso (C.SASSO@INRIM.IT) Supervisors: Topic 1: Maurizio Galetto Topic 2: Maurizio Galetto Topic 3: Massimo Santarelli Topic 4: TBD

Objectives	Topic 1: This proposal aims to develop micro- and nano-force standards for force traceability in MEMS, nanotech, and medical devices, addressing surface effects, uncertainties, and computational modeling. 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. Topic 3: Preparation of CO2 gas mixtures following the International Standards ISO6142-1 and ISO17034. Isotopic composition determination by CRDS and FTIR spectroscopies. Evaluation of measurement uncertainty. 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.

Skills and competencies for the development of the activity	Topic 1: Skills in mechanical measurements, measurement uncertainty assessment, Finite Element Method (FEM) programs, Matlab and LabVIEW development environment are appreciated, but not mandatory. Topic 2: Skills on mechanical measurements, measurement uncertainty assessment, Finite Element Method (FEM) programs, Matlab and LabVIEW development environment are appreciated, but not mandatory. Topic 3: Solid background in analytical chemistry, spectroscopic techniques and basic knowledge in metrology. 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.