

UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II

**DOTTORATO DI RICERCA / PhD PROGRAM IN  
INFORMATION TECHNOLOGY AND ELECTRICAL ENGINEERING**

## **Seminar announcement**

**Tuesday 20 June 2023, Time: 15:00**

**Room CL-T3, Floor 0, Building 1, BIENNIO - Via Claudio, 21 - NAPOLI**



**Prof. Manuel Vázquez**

**IEEE Magnetics Society Distinguished Lecturer 2023**

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## **Cylindrical Micro- and Nanowires: From Curvature Effects on Magnetization to Sensing Applications**

**Abstract:** Research on curvature effects in magnetic nanostructures is gaining interest as they provide new options compared to planar systems. The magnetic response of ferromagnetic wires in cylindrical geometry is influenced by their curvature, diameter, length, and aspect ratio. Key magnetic configurations include axial, transverse, and vortex arrangements. Microwires with diameters ranging from 1 to 200 micrometers are produced using solidification techniques. Amorphous wires with high magnetostriction exhibit bistable behavior and are used in various devices such as sensors and electromagnetic shielding. Ultrasoft non-magnetostrictive microwires are employed in field sensors and magnetometers. Nanowires with diameters

of 20 nm to 400 nm exhibit exceptional behavior where crystalline structure competes with shape anisotropy. Cylindrical nanowires are used as scaffolds for 3D nanoarchitectures and are proposed for sensor devices, magnets, and energy devices. Advanced techniques like X-ray magnetic circular dichroism (XMCD) and magnetic force microscopy (MFM) are used to investigate magnetization reversal modes in individual nanowires. Nanowires have various magnetic configurations and effects, and they find applications in biomedical fields such as cancer treatment and magnetic resonance imaging (MRI) contrast agents.

(...extended abstract available [here](#))

**Lecturer short bio:** Manuel Vázquez has been a Professor of Research at the Spanish Council for Research (CSIC) since 1996. With a specialization in magnetism of nano- and microwires, he has led numerous scientific projects and supervised 35 Ph.D. students. He has an extensive publication record with over 600 papers, 23 patents, and contributions to several books. Prof. Vázquez has held significant positions including Head of Laboratory at the Institute of Applied Magnetism and Manager of the Spanish Strategic Action on Nanoscience and Nanotechnology. He established the Group of Nanomagnetism and Magnetization Processes at ICMM/CSIC. Furthermore, he has made significant contributions to international organizations, including founding the Spain Chapter and serving as President of the IEEE Magnetics Society. He has received prestigious awards such as the IEEE Magnetics Society's Distinguished Service Award and the Salvador Velayos Award from the Club Español de Magnetismo. (... more detailed bio available [here](#))

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