

INTENSIVE WORKSHOP

# From Atoms to Intelligence

Multi-Scale Memristive Design  
for Neuromorphic Systems and  
AI Accelerators



**20-23 July 2026**



**In-person • English**



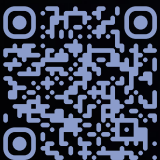
**NOVA FCT** Auditório Manuel Laranjeira, Ed. II



**Certification**



**Capacity: 40 participants**



**Free registrations open  
until the 3<sup>rd</sup> of July**



# Workshop overview

From Atoms to Intelligence: Multi-Scale Memristive Design for Neuromorphic Systems and AI Accelerators



## Overview

This four-day intensive workshop brings together leading experts from academia and industry to explore the full vertical integration of memristive technologies - from atomistic material understanding to neuromorphic architectures and AI accelerators. Through lectures and hands-on work, participants will connect device physics, compact modeling, circuit design, and system-level computing concepts.



## Instructional Team



**Gianluca Milano** is Senior Researcher at the Italian National Institute of Metrological Research (INRIM). His research focuses on electronic and ionic transport in nanodevices and memristive systems for neuromorphic computing. He is recipient of the ERC Starting Grant MEMBRAIN and former coordinator of the European MEMQuD project. He is Associate Editor of

APL Machine Learning, co-organizer of international workshops on neuromorphic hardware, and recipient of the 2021 NEST Prize for Nanoscience.

**Stephan Menzel** received his PhD degree (summa cum laude) from the RWTH Aachen University in 2012. Since 2012, he has been at the Peter Grünberg Institut (PGI-7) at Forschungszentrum Juelich as senior scientist. He is now the head of the simulation group at the PGI-7, Forschungszentrum Juelich. His group developed simulation tools for resistive switching devices which are commonly available, i.e. the Jülich-Aachen ReRAM Tools (JART). He was a visiting scientist at IBM Research, Rüschlikon. His research interests include physics, characterization, modeling, and simulation of resistive switching (memristive) devices and computing-in-memory and neuromorphic computing circuits exploiting memristive devices.



**Valeria Bragaglia** is a Research Scientist at IBM Research-Zurich and part-time Associate Professor at Eindhoven University of Technology. She leads the development of oxide-based BEOL device technologies, among which ReRAM, for analog in-memory computing, spanning thin film growth, device integration, and physics-aware compact modeling for

circuit design. Recipient of the 2024 CNR-IMM Early Career Award, she holds a Ph.D. in Physics from Humboldt University Berlin and bridges materials science with next-generation computing.



## Key Takeaways

1. Understand and explain the multi-scale integration of memristive technologies, from atomistic material behavior and resistive switching mechanisms to circuit-level abstraction and neuromorphic/AI accelerator architectures.
2. Evaluate industrial and system-level constraints: including scalability, variability, energy efficiency, and integration challenges to assess the translation of memristive devices into reliable, next-generation AI hardware platforms.
3. Model and analyze memristive networks for physical reservoir computing using graph-theoretical approaches, and develop compact device models supported by multi-scale electro-thermal simulations in MATLAB and COMSOL.



## Requirements

To fully participate in the practical exercises, please bring your own laptop. Attendees should have a basic familiarity with Python, as we will be using it alongside COMSOL throughout the hands-on sessions.



**Asal Kiazadeh** is an Assistant Professor and leading scientist at CENIMAT|3N, specializing in resistive switching devices, nanoelectronics, and neuromorphic and RF technologies. She is the PI and scientific leader of several international and national projects, including TERRAMETA, GAIA, ELEGANCE, and VOCMemSense. Her research focuses on advanced memristive materials and devices for next-generation computing and sensing applications, bridging fundamental materials science with innovative electronic technologies.

**Carlos Silva** is a Postdoc Researcher at Universidade Nova de Lisboa, where he earned a PhD in Nanotechnologies and Nanosciences and an Integrated Master's in Electrotechnical and Computer Engineering. His research focuses on zinc-tin oxide memristive devices and artificial synapses for sustainable neuromorphic computing.

