

**The Institute for Microelectronics and Microsystems (IMM) – Agrate Brianza Unit  
of the National Research Council (CNR)  
opens 2 Post-Docs Positions**

funded through the European Horizon 2020 ICT project **MeM-Scales** "*Memory technologies with multi-scale time constants for neuromorphic architectures*" (contract number n. 871371)

**Project description.**

The overall objective of the **MeM-Scales** project (January 1, 2020 - December 21, 2022) is the joint co-development of a novel class of algorithms, devices and circuits that reproduce multi-timescale processing of biological neural systems. Indeed, biological brains can integrate information across timescales that span many orders of magnitude, from millisecond visual information processing to many years of long-term memory consolidation and forgetting. In MeM-Scales we aim at building a novel class of neuromorphic computing systems that can integrate temporal information over multiple timescales and process efficiently real-world sensory signals and natural time-series data in real-time, e.g. for low-power and always-on IoT and edge-computing applications. The project consortium is broadly interdisciplinary, joining 9 international groups (Research centers, Universities and Industry) from material science through microchip design & manufacturing to computational neuroscience and machine learning.

**Open Position description.** Within the **MeM-Scales** project, the group at **CNR-IMM, Unit of Agrate Brianza (Italy)** ([www.mdm.imm.cnr.it](http://www.mdm.imm.cnr.it)) will target in collaboration with international partners the development of novel memory and device technologies, with focus on RRAM and PCM, supporting on-chip learning over multiple timescales. In this framework, we are going to open 2 post- doc positions (*assegno di ricerca post dottorale*) under the scientific supervision of Dr. Sabina Spiga.

**Position A: Development of novel hardware technologies and memristive devices for neural networks supporting multiple timescales.** The focus will be the development of non-volatile memory and memristive systems with tunable volatility that will be used in the project to develop neurons and synaptic circuits implementing multi-timescales online learning. The work for this post-doc position will include material synthesis (ALD, electron beam deposition, sputtering), device fabrication (using the local clean room facilities) and electrical testing (DC, variable temperature and pulsed characterization) at the CNR-IMM. Technology of interest are mainly related to RRAM and CBRAM and transition metal oxides (HfOx, SiOx, TaOx,.....). Short exchange visit at international partner sites to address the implementation of the new hardware in neuron and synaptic circuits are planned

**Position B. System-level simulation of spiking neural networks.** The focus will be the development of system level simulation of spiking neural networks implementing the information integration over multiple timescales. Models for neurons and synapses will be developed on the base of experimental data from real hardware. The activity will serve: (i) as a guide for the development of synapse and neuron devices and circuits, and (ii) to guide the tuning of synapse and neuron parameters for specific applications. Simulations and hardware development will be performed in a close loop and continuous feedback. The post-doc will work in close collaborations with international partners and short exchange visits are planned.

**Application:** through public selection "assegno di ricerca post dottorale" which will be posted soon on the CNR [web site](#).

**Contact for further information:**

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**We have also the possibility to accept master or PhD students on the same project. If you are interested, please contact us.**