# Marie Curie Postdoc Fellowship

# 2026

## 1. Supervisor

**Supervisor**: **Michele Bellesi, MD, PhD**
Associate Professor of Human Physiology
School of Biosciences and Veterinary Medicine
University of Camerino (UNICAM), Italy
Website: https://www.bsr-laboratory.org/
ORCID: 0000-0002-3922-0188

**Brief CV**

Prof. Michele Bellesi is a physician-scientist and Associate Professor of Human Physiology at the University of Camerino. His research focuses on the neurobiology of sleep, with particular emphasis on glial biology, sleep-dependent synaptic remodeling, and translational neuromodulation approaches.

He obtained his MD (cum laude), completed a residency in Neurology, and earned a PhD in Neuroscience. He conducted postdoctoral training at the University of Wisconsin-Madison (USA), where he contributed to seminal discoveries on sleep-dependent synaptic scaling (Science, 2017) and glial remodeling across sleep and wake.

He later held academic positions at the University of Bristol (UK) and currently leads the BSR (Brain & Sleep Research) Laboratory at UNICAM.

He has:

- H-index: 34
- 4,665 citations
- 80 peer-reviewed publications
- Publications in **Science, PNAS, Nature Communications, eLife, Journal of Neuroscience, Sleep**, etc.

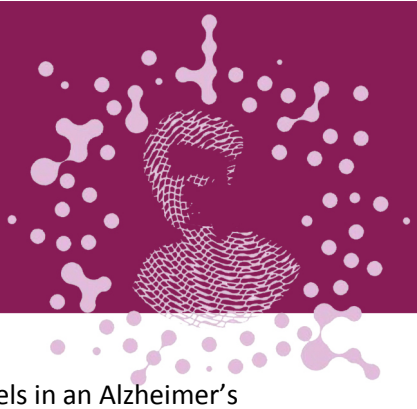
His work has received broad international media coverage (NYT, BBC, Scientific American, The Guardian).

He has supervised:

- 8 postdocs
- 12 PhD students
- 14 Master students
  across institutions in Italy, USA, and UK.

**Selected Publications**

1. de Vivo L*, Bellesi M* et al., Science, 2017 – Ultrastructural evidence for synaptic scaling across the sleep/wake cycle.
2. Bellesi et al., J Neurosci, 2017 – Sleep loss promotes astrocytic phagocytosis and microglial activation.
3. Bellesi et al., Sleep, 2018 – Myelin modifications after chronic sleep loss.
4. Simayi et al., PNAS, 2026 – Sleep loss induces cholesterol-associated myelin dysfunction.



5. Zhang et al., iScience, 2025 – Rocking during sleep reduces beta-amyloid levels in an Alzheimer's mouse model.

**Funded Projects (selected)**

- MUR Grant – The Language Of DrEams (Head of Unit)
- Wellcome Trust – Boosting sleep to promote myelination (PI)
- Alzheimer Research UK – Enhancing sleep to delay tauopathy (PI)
- PNRA 2024 – Gut microbiota and sleep in Antarctic expeditions (Co-I)
- UK MS Society – Timed acoustic stimulation in multiple sclerosis (Co-PI)

**Contacts**

Phone: +39 0737 40 3235

Email: michele.bellesi@unicam.it

## 2. Research Group and Facilities

**Laboratory & Facilities:** The Brain & Sleep Research (BSR) Laboratory at the University of Camerino investigates the neurobiological foundations of sleep and its role in brain plasticity, metabolic homeostasis, and resilience to neurological disorders. The laboratory integrates systems neurophysiology, cellular and molecular neuroscience, and translational neuromodulation approaches to understand how sleep shapes brain function across scales.

A central focus of the group is the interaction between sleep architecture, slow-wave dynamics, and glial-mediated mechanisms of brain remodeling and clearance. By combining high-resolution electrophysiology with cellular and molecular analyses, the laboratory aims to bridge mechanistic insights with translational applications.

The research environment supports both experimental animal models and human neurophysiology. The laboratory is equipped for multimodal sleep recording, including high-density EEG and polysomnography, and has established platforms for closed-loop sensory stimulation during sleep. These approaches are integrated with behavioral phenotyping, histological and immunohistochemical analyses, confocal imaging, and molecular assays, allowing comprehensive investigation from network-level activity to subcellular processes.

The BSR Laboratory also benefits from active collaborations with industrial partners in the development of sleep-modulating technologies, providing a translational dimension that connects basic discoveries to real-world applications.

**Research Network:** The group operates within a highly international and interdisciplinary network, including collaborations with institutions in the United Kingdom, Switzerland, Spain, and across Italy. These partnerships span expertise in neuroimaging, computational neuroscience, clinical sleep research, and neurodegeneration.

Through previous and ongoing collaborations with institutions such as the University of Bristol, King's College London, USI-Lugano, the University of Milan, and IMT Lucca, fellows hosted at UNICAM are embedded in a

dynamic European research ecosystem. The laboratory also maintains long-standing academic-industry collaborations, including joint technology development projects.

This international framework provides the MSCA fellow with opportunities for secondments, methodological exchange, and exposure to complementary scientific perspectives, fostering interdisciplinary and translational training.

## 3. Research Thematic Area/Project Idea

**Title of the project:** Sleep-dependent brain clearance mechanisms and their modulation through sensory-based neuromodulation

**Macroarea:** LS5 – Neurosciences and neural disorders

**Keywords:** Sleep neurobiology; Glymphatic system; Brain clearance; Glial biology; Sensory stimulation; Neuromodulation; Neurodegeneration; Translational neuroscience.

**Project Overview**: Sleep is increasingly recognized as a fundamental regulator of brain homeostasis, influencing synaptic plasticity, metabolic balance, and large-scale network dynamics. Emerging evidence suggests that sleep plays a critical role in promoting brain clearance mechanisms, including glymphatic function and glial-mediated metabolic waste removal. Disruptions of sleep architecture and slow-wave activity have been associated with impaired clearance, altered neural excitability, and increased vulnerability to neurodegenerative and neuropsychiatric disorders.

This research theme aims to investigate the mechanisms underlying sleep-dependent brain clearance and to explore whether these processes can be modulated through non-invasive sensory-based neuromodulation strategies. Particular emphasis will be placed on the interaction between sleep oscillations, glial physiology, and large-scale neural network activity, integrating systems neuroscience with cellular and molecular approaches.

The project will adopt a multilevel perspective, potentially combining electrophysiological recordings, behavioral phenotyping, molecular and histological analyses, and innovative closed-loop sensory stimulation paradigms. Depending on the fellow's expertise, the research may focus on mechanistic investigations in experimental models, translational human sleep studies, computational modeling of sleep-dependent dynamics, or cross-species comparative approaches.

The final research plan will be co-developed with the selected MSCA fellow, allowing the integration of complementary skills and ensuring high scientific originality and methodological innovation. The overarching goal is to advance our understanding of how sleep contributes to brain resilience and to identify novel strategies for enhancing sleep-dependent restorative processes.

## 4. Candidate and Career Plan

**Expected background of the candidate**

We welcome candidates with a strong background in:

- Neuroscience
- Neurophysiology
- Glial biology
- Systems neuroscience

- Biomedical engineering
- Sleep research
- Computational neuroscience
- Neurodegeneration research

Experience in at least one of the following is desirable:

- EEG analysis
- In vivo imaging
- Molecular neurobiology
- Sensory stimulation paradigms
- Data science approaches applied to neurophysiology

**Competences and knowledge to be developed by the candidate**

The fellow will gain:

- Advanced expertise in sleep neurobiology
- Training in closed-loop neuromodulation
- Experience in translational neuroscience
- Multimodal data integration (EEG, behavior, molecular endpoints)
- Grant writing and project leadership skills
- Exposure to industry-academia collaboration
- Supervision experience of junior students

A personalized Career Development Plan will be defined, including:

- International mobility and networking
- Training in leadership and research management
- Participation in European conferences
- MSCA-focused career mentoring