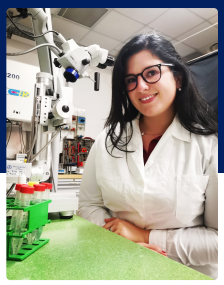

Jessica Lucchesi

11.09.1995
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Professional Profile

Postdoctoral Researcher at the Biophotonics Group (University of Florence /LENS), led by Prof. Francesco S. Pavone. My research activity is part of the PNRR project "COBRA" (COoperation and BRAin-Synchrony: a multiscale and translatable approach). My work lies at the intersection of optical systems and in vivo neuroscience, focusing on the development and optimization of a portable, miniaturized optical system (Miniscope) for brain-wide monitoring of calcium and hemodynamic signals in freely moving mice. I am involved in the full in vivo experimental pipeline, including stereotaxic surgeries, the design and implementation of complex behavioral paradigms, and data analysis. My research investigates social interaction dynamics through cooperation and competition tasks, aiming to uncover the neuronal mechanisms underlying inter-brain synchrony during naturalistic social engagement.

Technical Skills

- Functions A, C, and D: authorized to work with laboratory animals under transitional regulation (Art. 8, D.M. 05/08/2021)
- Management, care and housing of laboratory mice
- Animal handling and neurosurgical procedures in murine models
- Stereotaxic surgeries for optical cranial windows and chronic implants for miniaturized optical systems
- In vivo administration of viral vectors (e.g., GCaMP) drugs, anesthetics (IP, SC, retro-orbital routes)
- Management of anesthesia (isoflurane/injectables), analgesia protocols, and post-operative monitoring to ensure animal welfare and experimental reliability
- *Ex vivo:* transcardial perfusion, brain explant, vibratome sectioning, and immunoistochemistry

Professional Experiences

2024 - Ongoing: Postdoctoral Researcher - Biophotonics Lab, University of Florence, Department of Physics and Astronomy
In vivo experiments on freely moving murine models to investigate inter-brain synchrony in complex social paradigms. Performing stereotaxic surgeries for Miniscope device implantation and chronic optical window preparation. Independently managing the entire experimental workflow, from surgical preparation and setup development to advanced neural and behavioral data analysis.

2023-2024: Postdoctoral Researcher - Biophotonics Lab, University of Florence, LENS
Neurophysiological Investigation: Application of advanced optical imaging techniques to study cortical intercerebral synchronization during social interactions. Execution of in vivo experimental protocols, optimizing surgical preparation (cortical windows) and the use of miniaturized microscopes (Miniscope) to monitor brain activity in freely moving mice.

Academic Background

2019 - 2023: Ph.D. in Atomic and Molecular Photonics (XXXV cycle), University of Florence - LENS
Thesis Title: *In vivo calcium imaging of mice engaged in social behavior reveals widespread inter-brain synchrony*
Supervisor: Prof. Francesco Saverio Pavone
Co-supervisor: Dr. Anna Letizia Allegra Mascaro

2022: Ph.D. Internship Abroad - NIN - Netherlands Institute for Neuroscience (part of KNAW), Amsterdam
Project: *Study of neural basis using Functional Ultrasound Imaging (fUSI) during emotional contagion experiments*
Supervisor: Prof. Valeria Gazzola
Sector: *Social Brain Laboratory*

- Optical imaging techniques: wide-field microscopy, Miniscope
- Implementation of mouse behavioral paradigms
- Neurophysiological and behavioral data processing and analysis.

Computer Skills

- Windows, Linux
- MS Office
- Google Drive
- Inkscape
- Autodesk Fusion 360
- Jupyter Notebook, Spyder
- ImageJ
- Python, C++

Languages

- **Mother Tongue:** Italian ●●●●●
- **Further Languages:** English B2 ●●●●○○

Certifications and Licences

- Category B Drivers's Licence
- HACCP Certification

Master's Degree in Biomedical Biology
University of Florence
Period: 2017 - 2019
Thesis Title: *Kinematics analysis and study of the distributed cortical activity during reaching and grasping task*
Supervisor: Dr. Anna Letizia Allegra Mascaro
Co-supervisor: Prof. Francesco Vanzi
Second Co-supervisor: Dr. Eros Quarta
Final Grade: 110/110 cum honor

Bachelor's Degree in Biological Science
University of Florence
Period: 2014 - 2017
Thesis Title: *Optical imaging of a cortical activity during learning of a motor task*
Supervisor: Dr. Anna Letizia Allegra Mascaro
Co-supervisor: Prof. Francesco Vanzi
Second Co-supervisor: Dr. Eros Quarta
Final Grade: 110/110 cum honor

Internships

Master's Internship
University of Florence - LENS
Period: September 2018 - September 2019
Project: *Behavioral and calcium analysis using optical imaging techniques to investigate cortical activity during the learning of the Reach-to-Grasp task*
Sector: Biophotonics Lab

Bachelor's Internship
University of Florence - LENS
Period: August - November 2017
Project: *Optical imaging of cortical activity in rodents during learning of the Reach-to-Grasp motor task*
Sector: Biophotonics Lab

Conferences and Seminars

• 2025

Society for Neuroscience 2025
San Diego, California, USA (15th - 19th November 2025)
Oral Talk: *MiCe - µScope: dual-wavelength cortical imaging of social interaction in freely moving mice*

• 2024

OPTICA Biophotonics Congress: Biomedical Optics
Fort Lauderdale, Florida, USA (7th - 10th April 2024)
Oral Talk: *MiCe - µScope to conduct Hyperscanning experiment in awake freely moving animals*

Seminar in the Course of Psychobiology and Animal Models (2024 and 2023)
Master's Degree in Biology – Curriculum: Behavioral Biology, University of Florence
Oral Talk: *Mesoscale calcium imaging of freely moving mice engaged in social interaction reveals widespread inter-brain synchrony*

• 2023

SPIE Photonics West 2023
San Francisco, California, USA (28th January - 2nd February 2023)
Oral Talk: *In vivo calcium imaging of mice engaged in social behavior reveals widespread inter-brain synchrony*

Neurobiology of Social Behavior - Workshop
Erice, Sicily, Italy (9th September - 14nd September 2023)
Poster Presentation: *Inter-brain synchorny is modulated by social interaction in mice*

• 2022

DCP22 - Dynamics and Complexity
Pisa, Tuscany, Italy (26th - 28th May 2022)
Invited Speaker: *In vivo calcium imaging of mice engaged in social behavior reveals widespread inter-brain synchrony*

• 2021

5th HBP Student COnference on Interdisciplinary Brain Research
Online (1st - 4th February 2021)
Oral Talk and Poster Presentation: *Head-mounted wide-field microscope to monitor bilateral cortical activity in freely moving mice during social interaction*

• 2020

BraYn 3rd Brainstorming Research Assembly for Young Neuroscientists
Online (25th - 26th November 2020)
Poster Presentation: *Kinematics analysis and study of the distributed cortical activity emerge in the mouse neocortex during Reach-to-Grasp*

Training and Courses

• 2024

"Data Science for Neuroscience"
Master's Degree in Data Science, Scientific Computing & Artificial Intelligence
Prof. L: Silvestri and Prof. A. Scaglione

• 2021

"Basic Elements for Researchers' Approach to the Use of Animals for Scientific Purposes"
13 E.C.M. Training credits providing by Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna

"Refinement in Surgical Procedures in the Animal Model"
CERC - Fondazione Santa Lucia di Roma

"Python for Data Analysis"
European Laboratory for Non-Linear Spectroscopy (LENS)
Dr. G. Mazzamuto and Dr. A. Scaglione

- **2020**

"Microscopy and Imaging- basic and advanced level"
European Laboratory for Non-Linear Spectroscopy (LENS)
Dr. R. Cicchi, L. Sacconi, L. Silvestri, M. Capitanio, F. Vanzi, and A. Burchianti

Publications

Scaglione A.*, **Jessica Lucchesi***, Mascaro A.L.A. , and Pavone F.S.
"Frequency-Dependent Inter-Brain Synchrony is Modulated by Social Interaction in Freely Moving Mice"
(bioRxiv 22 May 2024)

Jessica Lucchesi, Scaglione A., Quarta, E. Mascaro A.L.A., and Pavone F.S.
"Wide-field Calcium Imaging of Mesoscale Networks Underlying the Encoding of Skilled Voluntary Movement"
Awake Behaving Mesoscopic Brain Imaging (161-184), Springer US 2024

Jessica Lucchesi, Scaglione A., Mascaro A.L.A., and Pavone F.S:
"Miniaturized Head-mounted Wide-field Microscope to Monitor Bilateral Cortical Activity in Mice Engaged in Social Interaction"
SPIE Conference Proceeding 2023

Quarta E.*, Scaglione A.*, **Jessica Lucchesi,** Sacconi L., Mascaro A.L.A:[#], and Pavone F.S.[#]
"Distributed and Localized Dynamics Emerge in the Mouse Neocortex during Reach-to-Grasp Behavior"
Journal of Neuroscience 2022