

Alessandro R. Galloni

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Summary

Curious and impact-driven **computational neuroscientist** with background in **systems neuroscience** and electrophysiology and 8+ years of experience managing both computational and experimental research projects. Adept at troubleshooting complex engineering problems and turning multimodal datasets into interpretable insights. Specialties include neural signal analysis, computational modeling, deep learning in PyTorch, scientific communication, and data visualization.

Research Experience

Rutgers University, Center for Advanced Biotechnology and Medicine

Piscataway (NJ), USA

EMBO POSTDOCTORAL FELLOW, COMPUTATIONAL NEUROSCIENCE

Feb. 2021 - present

- Built a **PyTorch** wrapper for **biology-inspired recurrent neural networks**
- Led a collaboration on **neuromorphic computing**, with energy- and sample-efficient **reinforcement learning** on novel hardware
- Built recurrent neural networks and used **SciPy** ODE solvers to compute neural temporal dynamics
- Used **dimensionality reduction** methods and **matplotlib** to visualize high-dimensional loss landscapes during neural network training
- Developed analysis pipeline for fitting **GLM models** to imaging data and visualizing experimental data from brain recordings

PONS.ai (generative AI startup)

Hong Kong / Remote

SUMMER INTERNSHIP

July - Aug. 2022

- Built simple **recommender system** using collaborative filtering
- Explored different algorithms for **Neural Style Transfer**

Neuromatch Academy – Deep Learning

New York / Remote

SUMMER SCHOOL RESEARCH PROJECT

Aug. 2021

- Trained **U-Net model** to perform **image segmentation** of brain regions from fMRI images
- Explored **data augmentation** strategies, including image transformations and synthetic data created with a **GAN** (Generative Adversarial Network)

The Francis Crick Institute

London, UK

PHD IN NEUROSCIENCE (4 YEARS) / POSTDOCTORAL RESEARCHER (1 YEAR)

Sept. 2015 - Feb. 2021

- Used **Python** and **MATLAB** to analyze connectivity and activation properties in neurons across different visual areas of the mouse brain
- Used **K-means clustering** to classify different cell types
- Measured **voltage and current time series data** from pyramidal neurons in the mouse visual cortex
- Created detailed **biophysical models** of the influence of dendrites on neuronal activation

University College London

London, UK

MSCI THESIS RESEARCH

Oct. 2014 - March 2015

- Built Arduino-based hardware with custom 3D-printed parts to deliver mechanical stimuli to study sleep in zebrafish
- Analyzed time series of their behavioral data

Education

University College London & The Francis Crick Institute

London, UK

PHD IN NEUROSCIENCE (BOEHRINGER INGELHEIM FONDS FELLOW)

2015 - 2020

- Awarded competitive Boehringer Ingelheim Fonds fellowship

University College London

London, UK

MASTER OF SCIENCE (MSCI) IN NEUROSCIENCE (INTEGRATED UNDERGRADUATE AND MASTER'S DEGREE)

2011 - 2015

- **Grade: First Class (Hons.)** (highest grade in the UK system)

Skills

TECHNICAL

Software engineering

Deep learning (PyTorch), scientific computing (NumPy, SciPy), jupyter, pandas, matplotlib, git

Programming Languages

Python, MatLab, Igor Pro

Experimental skills

Confocal microscopy, electrophysiology (patch-clamp voltage recordings), optogenetics

Other Software

Adobe Illustrator, LaTeX

Additional Training

Neuromatch Academy – Deep Learning (NMA-DL)

3-week course on deep learning using modern neural network architectures

New York, USA

2021

CAJAL Course in Computational Neuroscience

4-week course in computational neuroscience at the Champalimaud Centre for the Unknown

Lisbon, Portugal

2018

Science communication course (Boehringer Ingelheim Fonds)

Training on scientific presentation to both technical and lay audiences, data visualization and figure design

Mainz, Germany

2017

EMBO Laboratory Leadership course

Course covering effective approaches to leadership and communication when building and managing teams

New York, USA

2024

Leadership & Management Experience

Workshop organizer at Computational Systems Neuroscience (**COSYNE 2023**) conference

Montreal, Canada

Teacher at Cold Spring Harbor Laboratory (Ion Channel & Neural Circuit Physiology)

Cold Spring Harbor, USA

Supervising graduate and undergraduate students at Rutgers University

Piscataway (NJ), USA

Teaching assistant at University College London

London, UK

Honors & Awards

Competitive awards

2022 EMBO Postdoctoral Fellowship (value: \$125'000)

2016 Boehringer Ingelheim Fonds PhD Fellowship (value: \$110'000)

2013 UCL Dean's List award for outstanding academic achievements

2012 UCL Dean's List award for outstanding academic achievements

Minor awards

2023 Best presentation (1st place), Rutgers Postdoctoral Symposium

2017 Poster prize (2nd place), Cortical Feedback spring workshop

2013 UCL Dean's Summer Scholarship (8 week research project)

2012 Wellcome Trust Biomedical Scholarship (8 week research project)

Publications

2024 **Neuromorphic one-shot learning utilizing a phase-transition material**

Galloni, A.R., Yuan, Y., et al., Ramanathan, S., Milstein, A.D., [Proceedings of the National Academy of Sciences \(PNAS\) USA](#), 121(17)

- **Computational neuroscience / Machine Learning:** Reinforcement learning on neuromorphic hardware

2022 **Recurrent excitatory feedback from mossy cells enhances sparsity and pattern separation in the dentate gyrus**

Galloni, A.R., Samadzelkava, A., Hiremath, K., Oumnov, R., Milstein, A.D., [Frontiers in Computational Neuroscience](#), 16:82

- **Computational Neuroscience:** Neural dynamics in biologically realistic excitatory/inhibitory recurrent networks

2022 **Dendritic domain-specific sampling of long-range axons shapes feedforward and feedback connectivity of L5 neurons**

Galloni, A.R., Ye, Z., Rancz, E.A., [Journal of Neuroscience](#), 42(16) 3394-3405

- **Neurophysiology / Signal Processing:** Spatio-temporal distributions of synaptic activity underlying long-range neural connections

2020 **Apical length governs computational diversity of layer 5 pyramidal neurons**

Galloni, A.R., Laffere, A., Rancz, E.A., [eLife](#), e55761

- **Neurophysiology / Computational Neuroscience:** Impact of dendritic morphology on electrical properties of neurons
- Selected for poster presentation at the 2018 **Computational & Systems Neuroscience (COSYNE)** conference