Alessandro R. Galloni

121 Birch Ave, Princeton, NJ 08542, USA

(+1) 332-201-5325 | alessandro.galloni.11@ucl.ac.uk | argalloni.github.io | argalloni | @argalloni | Nationality: USA, Italy (dual citizenship)

Summary

Curious and impact-driven data scientist with 4 years of experience applying machine learning and AI tools to solve biological problems in the brain and 10 years of experience managing computational and experimental research projects. Adept at troubleshooting complex engineering problems and turning multimodal datasets into interpretable insights, ranging from data curation and modeling to software and AI engineering. Specialties include deep learning in PyTorch (computer vision), building exploratory data analysis pipelines, computational modeling, scientific communication, and data visualization.

Research & AI experience

Rutgers University, Center for Advanced Biotechnology and Medicine
Piscataway (NJ), USA
COMPUTATIONAL NEUROSCIENTIST (EMBO POSTDOCTORAL FELLOW) · *Feb. 2021 - present*

- Built a **PyTorch wrapper** for biology-inspired neural networks
- Led a collaboration on neuromorphic computing, developing neuroAI models for **reinforcement learning** on novel hardware
- Built **recurrent neural networks** to model neural dynamics in the brain
- Used **Principal Component Analysis (PCA)** to **visualize loss landscapes** during neural network learning
- Developed analysis pipeline for fitting **GLM models** and visualizing experimental data recorded 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 / UCL
London, UK
PHD THESIS PROJECT · *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
- Created detailed **biophysical models** of the influence of dendrites on neuronal activation

CAJAL Course in Computational Neuroscience
Lisbon, Portugal
SUMMER SCHOOL RESEARCH PROJECT · *Aug. 2018*

- Trained **spiking neural networks (SNNs)** on pattern recognition tasks using **unsupervised learning** rules

University College London
London, UK
MSci THESIS PROJECT · *Oct. 2014 - March 2015*

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

Skills

TECHNICAL	**Software engineering**	Deep learning (PyTorch), scientific computing (NumPy, SciPy), jupyter, pandas, matplotlib, git
	Programming Languages	Python, MatLab, Igor Pro
	Other Software	Adobe Illustrator, LaTeX
	Experimental skills	Confocal microscopy, slide scanner fluorescence imaging, electrophysiology (voltage recordings)
LANGUAGES	**English**	native level
	Italian	native level
	Swedish	native level speaking, intermediate level writing/reading
	French	Intermediate (B1-B2 level)

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)

Additional Training

Science communication course   *Mainz, Germany*

Training on scientific presentation to both technical and lay audiences, data visualization and figure design   *2017*

EMBO Laboratory Leadership course   *New York, USA*

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