Maxime Beau, Ph.D.

Systems and Computational Neuroscience

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Google Scholar

Neuroscientist specialized in systems neuroscience (high-density electrophysiology, optogenetics, rodent behaviour, cerebellum) and computational neuroscience (biophysical modelling, deep learning, dynamical systems). Lead contributor of an international collaboration that developed a semi-supervised deep-learning model for neuron cell-type classification (Beau et al., Cell, 2025). Author of NeuroPyxels, the first Python library for analyzing high-density Neuropixels recordings (github.com/m-beau/NeuroPyxels).

Education

2018-2025 **PhD, Systems and Computational Neuroscience**, *University College London*.
Neural Computation Laboratory. Mentors: Michael Häusser, Beverley Clark, Dimitar Kostadinov

2016-2017 **MSc, Neuroscience**, *Université Pierre et Marie Curie*.
Master Recherche de Sciences, Technologie, Santé - Biologie Intégrative et Physiologie (BIP)

2014-2016 **MD-PhD Programme**, *Université Paris Descartes*.
Programme Médecine-Science

2013-2016 **Medical school Bachelor**, *Université Paris Descartes*.
Diplôme de Formation Générale en Sciences Médicales

Research Positions

2025-present **Postdoctoral researcher, Neuroscience**.
Brody lab, Princeton University, Princeton, NJ, USA

2018-2025 **Graduate researcher, Neuroscience**.
Neural Computation Laboratory, University College London, London, UK
Projects:
- Study of long-range information transmission along the cerebellar output pathway in behaving mice.
- Co-discovery of reward-predictive signals in the cerebellum.

Collaborations:
- Lead author of the Cerebellum Cell-types Classification Collaboration (C4) - *Duke University, Baylor College of Medicine, University College London*
- Testing and deployment of Neuropixels silicon probes - *Neuropixels consortium*
- Comparison of gated linear networks and cerebellar microcircuit architectures - *DeepMind*

Summer 2024 **Trainee, Methods in Computational Neuroscience**.
Marine Biology Laboratory, Woods Hole, MA, USA
Geometrical and dynamical characterisation of RNN activity states during context-dependant perceptual decision-making. Mentored by Dr. Roozbeh Kiani and Dr. Srdjan Ostojic.

2016-2017 **MSc intern, Biophysical Modelling**.
Boris Barbour group, École Normale Supérieure, Paris, France
Computational exploration of the electrogenic properties of the axon initial segment in models of pyramidal and Purkinje cells

Summer 2016 **Research summer intern, Neural Network Modelling**.
Neural Computation Laboratory, University College London, London, UK
Study of the effect of the topology of artificial networks of cerebellar interneurons on network dynamics.

Summer 2015 **Research summer intern, Neuroendocrinology**.
Franck Oury group, INEM, INSERM U1151, Paris, France
Investigation of the involvement of the phosphate carrier protein Pit-1 in the function of the parathyroid hormone (PTH) in the hippocampus.

Summer 2014 **Clinical summer intern, Neurosurgery**.
Neurosurgery department, Necker hospital, Paris, France

Technical Expertise

Systems neuroscience.
- *In vivo* high-density electrophysiology (first Neuropixels recording in the cerebellum)
- Optogenetics, rodent behaviour (surgery, training, analysis)
- Analog and digital electronics, signal synchronization, Arduino programming
- Confocal microscopy, volumetric image processing
- Perfusions, histology, PCR, bacterial cloning

Computational methods.
- Machine Learning: clustering, semi-supervised learning, deep generative models (Beau et al., 2025)
- Neural data analysis: spike-sorting, spectral analysis, general linear models, dynamical systems
- Python open-source software development (NeuroPyxels)
- Biophysical modelling: NEURON and BRIAN simulation environments

Selected Publications

2025 **Beau, M.***, Herzfeld, D.*, ..., Häusser, M.† and Medina, J.†, *Cell*.
A deep learning strategy to identify cell types across species from high-density extracellular recordings.

2022 Senol, A.D., Pinto, G., **Beau, M.**, ... and Davenne, M., *Brain Communications*.
Alterations of the axon initial segment in multiple sclerosis grey matter.

2021 Sezener, E.*, Grabska-Barwinska, A.*, Kostadinov, D.*, **Beau, M.**, ... and Latham, P., *bioRxiv*.
A rapid and efficient learning rule for biological neural circuits. *UCL, DeepMind*.

2021 Steinmetz, N. A.*, Aydin, C.*, Lebedeva, A.*, Okun, M.*, Pachitariu, M.*, Bauza, M., **Beau, M.** ... and Harris, T., *Science*.
Neuropixels 2.0: A miniaturized high-density probe for stable, long-term brain recordings.

2020 Tsutsumi, S., Chadney, O. ... Bäumler, E., Faraggiana, L., **Beau, M.** and Häusser, M., *Cell reports*.
Purkinje Cell Activity Determines the Timing of Sensory-Evoked Motor Initiation.

2019 Kostadinov, D., **Beau, M.**, Pozo, M. and Häusser, M., *Nature Neuroscience*.
Predictive and reactive reward signals conveyed by climbing fiber inputs to cerebellar Purkinje cells.

Invited Talks

Mar 2025 John Hopkins Cerebellum Seminars
Jun 2024 Jon Driver Prize Winner
Jan 2024 French cerebellum day, Institute for Neurosciences of Montpellier, Montpellier, France
Oct 2023 University College London Open Science Award ceremony
Aug 2023 Cerebellum Gordon Research Conference (GRC), Bates College, ME, United States
Jan 2023 French cerebellum day, Institut du Cerveau et de la Moëlle Épinière, Paris, France
2018-2022 UCL Neuropixels Course
Jan 2022 Shadmehr lab, Johns Hopkins University, MD, USA
Jan 2020 Systems neuroscience department, Universtät Bern, Switzerland

Selected Conference Presentations

2023 - ME, USA **Beau, M.**, Stabb, H., ... and Häusser, M., *Cerebellum Gordon Research Conference*.
What Purkinje cells tell the nuclei: insights from monosynaptic paired recordings in behaving mice.

2022 - CA, USA **Beau, M.***, Herzfeld, D.J.*, ... Medina, J†. and Häusser, M.†, *Society for Neurocience*.
The C4 initiative: Cross-species cell type classification of high-density recordings in the cerebellar cortex.

2021 - online **Beau, M.**, Váradi, M., Ratto, R., Kostadinov, D., Cohen, D. and Häusser, M., *Society for Neuroscience*.
Signal transformations along the cerebellar output pathway in behaving mice.

2019 - Switz. **Beau, M.**, Kostadinov, D. and Häusser, M., *Cerebellum Gordon Research Conference*.
Functional interactions between cerebellar cortex and nuclei in behaving mice.

2018 - CA, USA **Beau, M.**, Kostadinov, D., Blanco Pozo, M. and Häusser, M., *Society for Neuroscience*.
Probing the functional interactions between distinct elements of the cerebellar cortex and deep nuclei circuitry in awake behaving mice.

Awards and Honors

2024 **William Morton Wheeler Family Founder's Scholarship**, *Awardee*, Marine Biology Laboratory.
Awarded to attend Woods Hole's summer school: methods in computational neuroscience. $3,000.

2024 **Jon Driver Prize**, *Winner*, University College London.
Competitive annual Prize awarded to outstanding early career neuroscientists from UCL.

2023 **UCL Open Science Award**, *Honourable mention*, University College London.
For NeuroPyxels: open-source python package for loading, processing and plotting of Neuropixels data.

2015 **Médecine-Science**, *Fellow, Université Paris Descartes*.
MD-PhD programme. €50,400 scholarship, declined. One of 19 laureates.

2014 **Medical School Entry Contest**, *Awardee, Université Paris Descartes*.
Ranked 27th out of 1914 candidates.

Teaching and Mentoring

2019-2025	Paris spring school of Imaging and Electrophysiology	*Teaching assistant, PhDs and postdocs*
2019, 2022	Lisbon Cajal training course: Interacting with neural circuits	*Teaching assistant, PhDs and postdocs*
2018, 2019	UCL Neuroscience BSc: NEURON modelling practicals	*Teaching assistant, undergraduates*
2021-2023	Hannah Stabb, UCL neuroscience integrated MSci	*Supervisor*
2021-2022	Federico d'Agostino, UCL machine learning MSc	*Supervisor*
2020-2021	Ago Lajko, UCL machine learning MSc	*Supervisor*
2019-2020	Michael Maibach, UCL neuroscience MSc	*Co-supervisor*

Open Source Projects

NeuroPyxels.
NeuroPyxels (npyx) is a Python library built for electrophysiologists using Neuropixels electrodes. It features a suite of core utility functions for loading, processing and plotting Neuropixels data.

CacheCache.
CacheCache is a Python library for decorating functions with flexible, runtime-configurable caching.

Volunteering and General Skills

Society executive positions

2019-2020	Co-founder of UPSyNe, UCL PhDs in Systems Neuroscience association
2019-2022	Executive board member of EMPA, the European MD-PhD association
2017-2018	General Vice President of AMPS, the French MD-PhD association

Programming

Python:	9 y. experience, see NeuroPyxels and CacheCache
MATLAB:	6 y. experience
Git:	9 y. experience in multi-collaborators codebase management

Extracurricular activities

Karate-Do:	Shotokan ryu, 2023-2025 Kentish Town Karate club instructor	*Black belt 2nd Dan (CSDGE)*