# MARIUS PACHITARIU

## APPOINTMENTS

| | | |
|---|---|---|
| 2017-present | Group Leader at HHMI Janelia | Ashburn, VA |

## POSTDOCTORAL EXPERIENCE

| | | |
|---|---|---|
| 2014-2017 | UCL<br>with Kenneth Harris and Matteo Carandini | London |

## EDUCATION

| | | |
|---|---|---|
| 2014 | Gatsby Unit, UCL<br>PhD, Computational Neuroscience and Machine Learning<br>with Maneesh Sahani | London |
| 2010 | Princeton University<br>BA, Mathematics (full needs-based scholarship) | Princeton |

## PREPRINTS

**Google scholar profile**

* denotes equal first or last author contribution

LaFosse, Flickinger, Jaindl, …, Stringer*, **Pachitariu*** *bioRxiv*
Raster photostimulation of large-scale neural populations

Nunez-Ochoa, Du, Zhong, Baptista, Michaelos, Sohn, Baruchin, Schroder, Stringer*, **Pachitariu*** *bioRxiv*
Linking neural representations to behavior using generalization

Stringer, Ki, DelGrosso, LaFosse, Zhang, **Pachitariu** *bioRxiv*
Extracting large-scale neural activity with Suite2p

Syeda, Nunez-Ochoa, Zhong, **Pachitariu**, Stringer *bioRxiv*
Orofacial behaviors, not eye movements, govern neural activity in mouse visual cortex

Muralidharan, Leng, Orts, Trepka, Zhu, Panichello, Jonikaitis, Pennington, **Pachitariu**, Moore *bioRxiv*
A system for live sorting of neuronal spiking activity from large-scale recordings

Zhang, Grodem, Gracias, Lensjo, Fyhn, Stringer*, **Pachitariu*** *bioRxiv*
Spatial predictive coding in visual cortical neurons

Stringer and **Pachitariu** *bioRxiv*
Cellpose-SAM: superhuman generalization for cellular segmentation

Keller, Kwak, Stark, **Pachitariu**, Branson, Dudman *bioRxiv*
Cortical control of innate behavior from subcortical demonstration

Miura, Kim, Jurjut, Kelley, Yang, Chen, Thete, Revah, Cui, **Pachitariu**, Pasca *bioRxiv*
Assembloid model to study loop circuits of the human nervous system

Hoeller, Zhong, **Pachitariu**, Romani *bioRxiv*
Bridging tuning and invariance with equivariant neuronal representations

Stringer, **Pachitariu** *bioRxiv*
Benchmarking cellular segmentation methods against Cellpose

Stagkourakis, Spigolon, Marks, Feydar, Kim, Perona, **Pachitariu*,** Andersen* *bioRxiv*
Anatomically distributed representations of instinct in the hypothalamus

**PUBLICATIONS** **Google scholar profile**
* denotes equal first or last author contribution

2026 O'Connell, Michaels, Wang, Mamidipaka, Venkatesh, Aresh, **Pachitariu,** Pruszynski, Sober, Pandarinath *eLife*
High performance sorting of motor unit action potentials with EMUsort

**Pachitariu,** Zhong, Gracias, Minisi, Lopez, Stringer *Nature*
A critical initialization for biological neural networks

2025 Du, Nunez-Ochoa, **Pachitariu***, Stringer* *Nat Comms*
A simplified minimodel of visual cortical neurons

Zhong, Baptista, Gattoni, Arnold, Flickinger, Stringer*, **Pachitariu*** *Nature*
Unsupervised pretraining in biological neural networks

Stringer and **Pachitariu** *Nat Methods*
Cellpose3: one-click image restoration improves cellular segmentation

Trautmann, Hesse, … , **Pachitariu**, … , Harris *Nat Neuro*
Large-scale high-density brain-wide neural recording in nonhuman primates

Stringer, Zhong, Syeda, Du, Kesa, **Pachitariu** *Nat Neuro*
Rastermap: a discovery method for neural population recordings

2024 **Pachitariu** and Stringer *Science*
Analysis methods for large-scale neural recordings

Syeda, Zhong, Tung, Long, **Pachitariu***, Stringer* *Nat Neuro*
Facemap: a framework for modelling neural activity based on orofacial tracking

**Pachitariu**, Sridhar, Pennington and Stringer *Nat Methods*
Spike sorting with Kilosort4

2022 **Pachitariu** and Stringer *Nat Methods*
Cellpose 2.0: how to train your own model

Gardner, Hermansen, **Pachitariu**, Burak, Baas, Dunn, Moser, Moser *Nature*
Toroidal topology of population activity in grid cells

Hart, …, **Pachitariu**, …, Wallisch *Journal of Open Source Education*
Neuromatch Academy: a 3-week, online summer school in computational neuroscience

Pandey, **Pachitariu**, Brunton, KD Harris *PLOS CB*
Structured random receptive fields enable informative sensory encodings

2021 Stringer, Michaelos and **Pachitariu** *Cell*
High precision coding in mouse visual cortex

Steinmetz*, Aydin*, Lebedeva*, Okun*, **Pachitariu***, …, Harris *Science*
Neuropixels 2.0: A miniaturized high-density probe for stable, long-term brain recordings

Stringer, Wang, Michaelos and **Pachitariu** *Nature Methods*
Cellpose: a generalist algorithm for cellular segmentation

Siegle, …, **Pachitariu**, … , Olsen and Koch *Nature*
A survey of spiking activity reveals a functional hierarchy of mouse corticothalamic visual areas

Eiselt, Chen, Chen, Arnold, Kim, **Pachitariu** and Sternson *Nature Neuroscience*
Hunger or thirst state uncertainty is resolved by outcome evaluation in medial prefrontal cortex to guide decision-making

Lee, Ni, Colonell, Karsh, Putzeys, **Pachitariu**, Harris, Meister *Nature Communications*
Electrode pooling can boost the yield of extracellular recordings with switchable silicon probes

Van Viegen, …, **Pachitariu**, …, Peters *Trends in Cognitive Sciences*
Neuromatch Academy: Teaching computational neuroscience with global accessibility

2020 Schroder, Steinmetz, Krumin, **Pachitariu**, Rizzi, Lagnado, Harris and Carandini *Neuron*
Arousal modulates retinal output

2019 Stringer and **Pachitariu** *Curr Opin Neurobiol*
Computational processing of neural recordings from calcium imaging data

Stringer*, **Pachitariu***, Steinmetz, Reddy, Carandini and Harris *Science*
Spontaneous behaviors drive multidimensional, brainwide activity

Stringer*, **Pachitariu***, Steinmetz, Carandini and Harris *Nature*
High-dimensional geometry of population responses in visual cortex

Allen, Chen, Pichamoorty, Tien, **Pachitariu,** Luo and Deisseroth *Science*
Thirst regulates motivated behavior through modulation of brainwide neural population dynamics

2018 Dipoppa, Ranson, Krumin, **Pachitariu**, Carandini and Harris *Neuron*
Vision and locomotion shape the interactions between neuron types in mouse visual cortex

Berens, Freeman, …, **Pachitariu**, … and Bethge *PLOS CB*
Community-based benchmarking improves spike rate inference from two-photon calcium imaging data

**Pachitariu**, Stringer and Harris *J Neuroscience*
Robustness of spike deconvolution for neuronal calcium imaging

2017 Jun, Steinmetz, …**Pachitariu**, … and Harris T *Nature*
Fully integrated silicon probes for high-density recording of neural activity

**Pachitariu** and Sahani *bioRxiv*

Visual motion computation in recurrent neural networks

2016 Stringer*, **Pachitariu***, Okun, Bartho, Harris, Sahani and Lesica *eLife*
Inhibitory control of shared variability in cortical networks

**Pachitariu**, Steinmetz, Kadir, Carandini and Harris *Neurips*
Fast and accurate spike sorting of high-channel count probes with Kilosort

**Pachitariu**, Stringer, Schroder, Dipoppa, Rossi, Carandini and Harris *bioRxiv*
Suite2p: beyond 10,000 neurons with standard two-photon microscopy

2015 Poort*, Khan*, **Pachitariu**, …, Sahani, Keller, Mrsic-Flogel and Hofer *Neuron*
Learning enhances sensory and multiple non-sensory representations in primary visual cortex

**Pachitariu**, Lyamzin, Sahani and Lesica *J Neuroscience*
State-dependent population coding in primary auditory cortex

**Pachitariu** *PhD thesis, UCL*
Neural dynamics in cortical populations

2013 **Pachitariu**, Petreska and Sahani *Neurips*
Recurrent linear models of simultaneously-recorded neural populations

**Pachitariu**, Pettit, Dagleish, Packer, Hausser and Sahani *Neurips*
Extracting regions of interest from biological images with convolutional sparse block coding

**Pachitariu** and Sahani *arXiv*
Regularization and nonlinearities for neural language models: when are they needed?

2012 **Pachitariu** and Sahani *Neurips*
Learning visual motion in recurrent neural networks

2010 **Pachitariu** *BA thesis, Princeton*
Spike train statistics

## ANALYSIS SOFTWARE

| | | |
|---|---|---|
| cellpose | Cellular segmentation | 2M+ downloads |
| suite2p | Calcium image analysis | 450k+ downloads |
| kilosort | Spike sorting | 150k+ downloads (since 2024) |
| rastermap | Visualization for large-scale recordings | 200k+ downloads |
| facemap | Behavior analysis | 120k+ downloads |

## DATASETS

*>63,000 downloads on figshare*

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|---|---|---|
| Pachitariu et al, 2026 | Recordings of 10,000 neurons at 22Hz across cortical areas and hippocampal CA1 during spontaneous activity | analysis code |
| Du et al, 2026 | Recordings of 29,000 neurons in mouse primary visual cortex in response to up to 65,000 natural images | analysis code |
| Zhong et al, 2025 | Recordings of 50,000+ neurons simultaneously in mouse visual cortex during task learning and unsupervised training | analysis code |

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|---|---|---|
| Syeda et al, 2024 | Recordings from 50,000+ neurons in mouse visual and sensorimotor cortex during spontaneous activity | analysis code |
| Stringer et al, 2021a | 70,000 labelled cells to train Cellpose segmentation algorithm | analysis code |
| Stringer et al, 2021b | Recordings of 20,000+ neurons in mouse primary and higher-order visual cortex in response to oriented stimuli | analysis code |
| Stringer*, Pachitariu* et al, 2019a | Recordings from 10,000+ neurons in mouse visual and sensorimotor cortex during spontaneous activity | analysis code |
| Stringer*, Pachitariu*, Steinmetz et al, 2019a | Recordings from 2,000-3,000 neurons with eight-probe Neuropixels during spontaneous behaviors | analysis code |
| Stringer*, Pachitariu* et al, 2019b | Recordings of 10,000 neurons in V1 in response to 2,800 natural images | analysis code |
| Pachitariu et al, 2018 | Recordings of 10,000 neurons in mouse V1 in response to drifting gratings | analysis code |

## TEACHING AT SUMMER SCHOOLS

*Since 2020, I have focused my efforts on the Neuromatch Academy (NMA), an online summer school for computational neuroscience, deep learning, computational climate tools and NeuroAI. NMA has served over 10,000 students since 2020, across 120+ countries. Since 2021, I have been the Group Projects Chair. In this capacity, I initiated and supported several key improvements to the research projects component of the program such as "project templates" and "project TAs". I am the longest serving chair for NMA.*

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| 2021- present | Neuromatch Academy Computational Neuroscience<br>Group Projects Chair | *online* |
| 2021- 2025 | Neuromatch Academy Deep Learning<br>Group Projects Chair | *online* |
| 2020 | Neuromatch Academy Computational Neuroscience<br>volunteer and projects mentor | *online* |
| 2019 | Neural Data Science (organizer) | *CSHL* |
| | Interacting with neural circuits (lecturer) | *Champalimaud* |
| | Learning to use Suite2p and Kilosort2 (organizer) | *Janelia* |
| 2018 | Neural Imaging Course (lecturer) | *CSHL* |
| | Junior Scientist Workshop on Theoretical Neuroscience (lecturer) | *Janelia* |
| 2017 | Neural Data Analysis (lecturer) | *CSHL* |
| | Neural Imaging Course (lecturer) | *CSHL* |
| | TENSS (lecturer) | *Romania* |
| 2016 | TENSS (lecturer) | *Romania* |

## WORKSHOPS

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|---|---|---|
| 2023 | *Neuropixels workshop* (lecturer) | *UCL* |
| 2022 | *Junior Scientist Workshop on Neural Circuits and Behavior* (organizer) | *Janelia* |
| 2021 | *Neuropixels workshop* (lecturer) | *UCL* |
| 2020 | *Allen Institute planning workshop* | *Allen Institute* |
| | *Neuropixels workshop* (lecturer) | *UCL* |
| 2016 | *Junior Scientist Workshop on Neural Circuits and Behavior* | *Janelia* |
| 2012 | *First deep learning summer school* | *IPAM UCLA* |
| 2011 | *Probabilistic models of cognition* | *IPAM UCLA* |

**AWARDS**

| | | |
|---|---|---|
| 2005-2006 | International Mathematics Olympiad<br>bronze (x2) | *Mexico, Slovenia* |
| 2002, 2004-2006 | Balkan Mathematics Olympiad<br>gold (x1), silver (x2), bronze (x1) | *Romania (x2), Bulgaria, Cyprus* |
| 2007-2008 | International Mathematics Contest<br>second prize (x2) | *Bulgaria, US* |
| 2001-2006 | Romanian National Mathematics Olympiad and IMO Training Team | *Romania* |