Dr. Joana Soldado Magraner

Curriculum Vitae

Education

2013–2018 **PhD**, The Gatsby Computational Neuroscience Unit, University College London (UCL), London, UK
PhD program in Theoretical Neuroscience and Machine Learning

2011–2013 **MSc**, Institute of Neuroinformatics, ETH-UZH, Zürich, Switzerland
Master's program in Neural Systems and Computation

2009–2010 **BSc&MSc**, RWTH-Aachen, Aachen, Germany
Erasmus programme exchange year, BSc+MSc in Physics.

2006–2011 **BSc&MSc**, Universitat de València, València, Spain
Licenciatura (BSc+MSc) in Physics.

Academic Employment History

2019-present **Postdoctoral Research Associate**, Carnegie Mellon University, Pittsburgh, US

2018-2019 **Postdoctoral Research Associate**, The Gatsby Computational Neuroscience Unit, UCL, London, UK

2012–2013 **Research Assistant**
HIFO, Brain Research Institute, University of Zürich

Postdoc project

project *Probing PFC dynamics and computation with patterned microstimulation perturbations.*
advisors Byron Yu and Matthew Smith

PhD thesis

thesis *Linear dynamics of evidence integration in contextual decision making.*
supervisor Maneesh Sahani
minor *First-order approximation of cross-validation for automatic regularization of estimators*
supervisor Aapo Hyvarinen

Master thesis

thesis *Integration of evidence in Recurrent Neural Networks with synaptic normalization.*
supervisors Valerio Mante, Michael Pfeiffer and Kevan Martin

Additional research experience

Research projects

2013 **Msc short project**, *Learning Reward States in a Probabilistic Categorisation Task*
Institute of Neuroinformatics, ETH-UZH Zürich.
Supervisor: Michael Pfeiffer.

2012 **Msc short project**, *Analysing two photon microscopy data from recordings of long-range projection neurons in somatosensory cortex of awake behaving mice*
HIFO, Brain Research Institute, University of Zürich.
Supervisors: Jerry Chen and Fritjof Helmchen.

Research fellowships

2009 **JAE-Intro (CSIC Research Introduction Scholarship)**, ATLAS Silicon Forward Tracker Group and GRID Computing Group, IFIC, CSIC-UV Particle Physics Institute, València, Spain

2008 **Research internship**, Environmental Radioactivity Laboratory, UV, Universitat de València, Spain

Academic experience

Mentoring

2021-present **Advisor and collaborator**, *Yuki Minai*, PhD Thesis, PhD program in Neural Computation and Machine Learning, CMU
'A closed-loop electrical microstimulation framework to control neural activity and behavior'

2021-2023 **Supervisor**, *Lucas Nadolskis*, MSc Thesis, Biomedical Engineering, CMU
'Exploring top-down visual pathways using micro-stimulation and its applications to cortical visual prosthesis'

2021 summer **Mentor**, Neuromatch Academy

2020-2021 **Supervisor**, *Mathew Hall*, MSc Thesis, Biomedical Engineering, CMU
'A convolutional neural network for generalized and efficient spike classification'

2017-2018 **Supervisor**, *Eugenie Ordonneau*, BSc Natural Sciences Literature Review module, UCL
'Decision-making cortical circuits for motion perception in the saccadic system of primates'

Teaching

2024-2025 **Guest lecturer**, *18-698 Neural Signal Processing*, Department of Electrical and Computer Engineering, CMU, graduate course.

2024-2025 **Future Faculty Program trainee**, *Eberly Center, CMU*
A teaching training program with seminars, teaching observations with feedback (during guest lectures), a course design project and a statement of teaching philosophy project.

2023-2025 **Teaching Coordinator**, *TReND-CaMinA school in Computational Neuroscience and Machine Learning Basics*, summer school
Teaching and Research in Natural Sciences for Development in Africa (TReND)

2023-2025 **Instructor**, *TReND course in Computational Neuroscience and Machine Learning Basics*, summer school
Machine Learning module: Dimensionality reduction techniques for neural data analysis

2016 **Teaching Assistant**, *Society for Neuronscience (SfN)*, short course
Data Science and Data Skills for Neuroscientists

2014 **Teaching Assistant**, Theoretical Neuroscience, The Gatsby Unit, UCL
PhD programme in Theoretical Neuroscience and Machine Learning

Reviewing

2022-2024 **Cosyne**, *Reviewer*, Computational and Systems Neuroscience conference

2023 **Cell**, *Co-reviewer*, Scientific journal

2023 **Communications Biology**, *Co-reviewer*, Scientific journal

2021 **Nature**, *Co-reviewer*, Scientific journal

2020 **Neuron**, *Co-reviewer*, Scientific journal

2018 **NEURIPS**, *Reviewer*, Neural Information Processing Systems conference

Conferences, workshops and schools

2023-2025 **Co-organiser**, *TReND-CaMinA*, Summer school in Computational Neuroscience and Machine Learning Basics
An intensive two-week course to teach African students the basics of Computational Neuroscience: a thriving and cost-effective research field to boost scientific capacity in the continent

2019 **Co-organiser**, *CapoCaccia*, Cognitive Neuromorphic Engineering Workshop
Working group: sRNNs stability, training and dynamics analysis

2019 **Co-organiser**, *Cosyne*, Computational and Systems Neuroscience workshop
Data, dynamics and computation: using data-driven methods to ground mechanistic theory

Boards and Commitees

2025 **Consultant**, REI-RICORS, Redes de Investigación Cooperativa Orientadas a Resultados en Salud, Inflamacion y Neuroinflamacion
Data science and statistics consultant

2020–2024 **Member**, IEEE Neuroethics working group
Contributing to write guidelines for the use of neurotechnologies and discussing their ethical, legal, social, and cultural implications.

2012–2013 **Board Member**, Frei Denken Zürich
Founded by an interdisciplinary group of students from Neuroscience, Medicine, Engineering, Philosophy and Ethics to promote 'Free Thinking' and rationality among students and the public.

2008–2009 **Student representative**, Physics Faculty Committee, Universitat de València

2008–2009 **Board member**, Physics Student Association, Universitat de València

Competitions and awards

2019 **NEUROTECH fellowship**, *CapoCaccia*, Cognitive Neuromorphic Engineering Workshop

2015 **Honourable mention**, *IWSP7 poster prizes*
The international workshop on seizure prediction.
Performance of synchrony and spectral-based features in early seizure detection: exploring feature combinations and effect of latency.

2014 **Top ten ranking**, *UPenn-Mayo Clinic Seizure Detection Challenge*
Kaggle Data Science contest for early seizure detection in epilepsy.
A method employing synchrony and spectral-based features with a random forest classifier for early seizure detection. Ranked 9th out of 205 participants.

Congresses, workshops and symposia attended

2024 **CPPC**, *Computational Properties of Prefrontal Cortex*

2014–2023 **COSYNE**, *Computational and Systems Neuroscience conference*

2016,2022,2024 **SfN**, *Society for Neuroscience meeting*, San Diego, USA

2022 **Bernstein Conference**, *Bernstein Network in Computational Neuroscience*, Berlin, Germany

2019 **CapoCaccia**, *Cognitive Neuromorphic Engineering Workshop*

2015,2017 **NCCD**, *Neural Coding, Computation and Dynamics workshop*

2017 **TENSS**, *Transylvanian Experimental Neuroscience Summer School*, Cluj-Napoca, Romania

2015 **IWSP7**, *The international workshop on seizure prediction*, Melbourne, Australia

2012 **FENS-IBRO-Hertie Winter School: Brain Dynamics and Dynamics of Brain Diseases**, Austria

Public engagement

2023-2024 **TReND**, *Teaching and Research in Natural Sciences for Development in Africa*, Outreach activities at local universities in Accra, Ghana and Kigali, Rwanda

2022 **SEMF Summer School**, *Society for Multidisciplinary and Fundamental Research*, Multidisciplinary talks and courses for young researchers and the general public, Universitat Politecnica de Valencia
Invited talk

2019 **William Perkin High School STEM enrichment day**, *Science workshop*, Sainsbury Wellcome Center Public Engagement Network, London

2015-2017 **Science week**, Physics and Neuroscience talks, Spanish high school Cañada Blanch, London

2013 **Robots on Tour**, ETH exhibitor assistant, Artificial Intelligence Lab, Zürich

Publications

Journal Articles

2025 **Robustness of working memory to prefrontal cortex microstimulation**, JNeuroscience special issue: Computational Properties of the Prefrontal Cortex, *(under review)*, preprint in *bioRxiv*, invited article.
Joana Soldado-Magraner, Yuki Minai, Matthew Smith and Byron Yu

2025 **Brain-computer interfaces as a causal probe for scientific inquiry**, *Trends in Cognitive Sciences (under review)*, invited review
Asma Motiwala*, Joana Soldado-Magraner*, Aaron Batista, Matthew Smith and Byron Yu

2024 **Inferring context-dependent computations through linear approximations of prefrontal cortex dynamics**, *Science Advances*
Joana Soldado-Magraner, Valerio Mante and Maneesh Sahani

2024 **Examining funders' roles in responsible research and innovation of medical neurotechnology**, *Journal of Responsible Innovation*
Denis Larrivee, Jennifer French, Alberto Antonietti, Zach McKinney, Noeline W Prins, Joana Soldado-Magraner, Michael J. Young, and Laura Y. Cabrera

2024 **Applying the IEEE Neuroethics Framework to Intra-cortical Brain Computer Interfaces**, *Journal of Neural Engineering*
Joana Soldado-Magraner*, Alberto Antonietti*, Jennifer French, Nathan Higgins, Michael J. Young, Denis Larrivee and Rebecca Monteleone

2018 **Brittleness in model selection analysis of single neuron firing rates**, *PNAS (under 2nd revisions)*, preprint in *bioRxiv*
Chandramouli Chandrasekaran, Joana Soldado-Magraner, Diogo Peixoto, William T Newsome, Maneesh Sahani and Krishna V Shenoy

2013 **Behaviour-dependent recruitment of long-range projection neurons in somatosensory cortex**, *Nature*, 499, 336-340
Jerry L. Chen, Stefano Carta, Joana Soldado-Magraner, Bernard L. Schneider and Fritjof Helmchen

Conference Papers

2024 **MiSO: Optimizing brain stimulation to create neural activity states**, *Neurips*
Yuki Minai, Joana Soldado-Magraner, Matthew Smith and Byron Yu

2022 **Reexamining the ethical, legal, social, and cultural implications for cochlear implants through a novel neuroethics framework**, *IEEE ISTAS 2022 proceedings*
Noeline Prins*, Rebecca Monteleone*, Joana Soldado-Magraner, Joanne Nash, Michael J. Young and Laura Y. Cabrera.

Presentations

Invited talks

2024 **Robustness of prefrontal cortex networks under patterned microstimulation perturbations**, *SfN*, Nanosymposium "Mechanisms of Working Memory and Cognitive Control in Prefrontal Circuits"
Joana Soldado-Magraner

2024 **Robustness of prefrontal cortex networks under patterned microstimulation perturbations**, *8th Computational Properties of Prefrontal Cortex Workshop*, Session "What can neural dynamics teach us about prefrontal function?"
Joana Soldado-Magraner

2022 **Inter-areal patterned microstimulation selectively drives PFC activity and behavior in a memory task**, *Bernstein conference*, Workshop "Distributed computations across brain regions"
Joana Soldado-Magraner

2022 **High-order computations by neural population dynamics in the prefrontal cortex**, *BARCCSYN*
Joana Soldado-Magraner

2021 **Context-dependent computations through linear dynamics in prefrontal cortex circuits.**, *Janelia-HHMI Research Campus*, Computation and Theory Lecture Series
Joana Soldado-Magraner

2019 **Linear dynamics of contextual decision-making**, *CapoCaccia*, Session "Biological foundations of signal integration"
Joana Soldado-Magraner

2019 **Inferring and interpreting neural dynamics during contextual decision making**, *Cosyne*, Workshop "Data, dynamics and computation: using data-driven methods to ground mechanistic theory"
Joana Soldado-Magraner

2018 **Linear dynamics of evidence integration in contextual decision making**, *Oxford*, Neurotheory Forum (ONTF)
Joana Soldado-Magraner

2016 **Do decision-related firing rates of dorsal premotor cortex neurons ramp or step on single trials?**, *SfN*, Nanosymposium "Visual Decision Making"
Chandramouli Chandrasekaran, Joana Soldado-Magraner, Diogo Peixoto, Maneesh Sahani and Krishna V. Shenoy

Poster presentations

2023 **Robustness of PFC networks under inter- and intra-hemispheric patterned microstimulation perturbations**, *Cosyne*, selected poster
Joana Soldado-Magraner, Yuki Minai, Matthew Smith and Byron Yu.

2022 **Inter-areal patterned microstimulation selectively drives PFC population activity across behavioral tasks**, *SfN*, accepted poster
Joana Soldado-Magraner, Yuki Minai, William Bishop, Matthew Smith and Byron Yu.

2022 **Inter-areal patterned microstimulation selectively drives PFC activity and behavior in a memory task**, *Cosyne*, selected poster
Joana Soldado-Magraner, Yuki Minai, William Bishop, Matthew Smith and Byron Yu.

2017 **Dynamically constrained vs unconstrained linear models of evidence integration in a contextual DM task**, *NCCD*, selected poster
Joana Soldado-Magraner, Valerio Mante and Maneesh Sahani

2015 **Linear dynamics of evidence integration in a contextual decision making task**, *NCCD*, selected poster
Joana Soldado-Magraner, Valerio Mante and Maneesh Sahani

2015 **Linear dynamics of evidence integration in a contextual decision making task**, *Cosyne*, selected poster
Joana Soldado-Magraner, Valerio Mante and Maneesh Sahani

2015 **Performance of synchrony and spectral-based features in early seizure detection: exploring feature combinations and effect of latency**, *IWSP7*, invited poster
Vincent Adam, Joana Soldado-Magraner, Wittawat Jitkrittum, Heiko Strathmann, Balaji Lakshminarayanan, Alessandro Davide Ialongo, Gergo Bohner, Ben Dongsung Huh, Lea Goetz, Shaun Dowling, Iulian Vlad Serban and Matthieu Louis

Online resources

Open-source code and teaching materials

2023-2024 **TReND-CaMinA course in computational neuroscience and machine learning basics**, Python notebooks, lecture slides and datasets, freely available at the TReND course Github repository
TReND-CaMinA course teaching team (Coordinator: Joana Soldado-Magraner).

Methods reports

2015 **Seizure Detection Challenge The Fitzgerald team solution**
Vincent Adam, Joana Soldado-Magraner, Wittawat Jitkrittum, Heiko Strathmann, Balaji Lakshminarayanan, Alessandro Davide Ialongo, Gergo Bohner, Ben Dongsung Huh, Lea Goetz, Shaun Dowling, Iulian Vlad Serban and Matthieu Louis

Computer skills

Coding	MATLAB (advanced), Python (advanced), C++, R, Labview, NEST, Mathematica, Root
OS	Linux (Ubuntu), Mac OS X, Microsoft Windows
Typesetting	LaTeX
Version Control	Github, svn
Cluster Computing	SLURM

Languages

Catalan	Mother tongue	
Spanish	Mother tongue	
English	Proficiency	
German	Intermediate	*DSH (Deutsche Sprachprüfung für den Hochschulzugang) level C1, 2010*
Portuguese	Conversational	