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Curriculum Vitæ

(January 2025)

Profile

My career path is characterized by a progression of my interest from theoretical physics, over computational neuroscience, to experimental neuroscience while directly applying previously acquired knowledge across these fields. Since Oct 2015, as an CNRS researcher, I integrate *in vivo* experimental and theoretical approaches to study the role of neuronal circuits in the cerebellum and the presubiculum. This combination opens exciting new pathways (i) to shed light on the role of the cerebellar circuitry during locomotion and adaptation, a task during which the cerebellum has been suggested to play a crucial role; and (ii) to understand the dynamical structure of the spatial orientation network of neurons in the presubiculum, serving as the brain's compass.
My extensive teaching activities include lectures and tutorials at the Neuroscience Masters of Université Paris Cité (M1 and M2, 30 h/year) and at the IMaLiS Master of the ENS (2 h/year). Courses provided cover topics including Introduction to Computational Neuroscience, Neural Data Science with Python, Systems Neuroscience and Neural Imaging.

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GitHub page : https://github.com/mgraupe

Education

Sep 2019 **Habilitation à Diriger des Recherches (HDR)**

Université Paris Descartes (France)

- Based on habilitation thesis and the presentation "Bridging Modeling and Experimental Neuroscience" in front of the HDR jury.
- HDR in Neuroscience allowing to supervise PhD students in the French academic system.

Jan 2004 – Jun 2008 **PhD in Neuroscience**

Université Paris Descartes (France) and Dresden University of Technology (Germany)

- Developed a biochemically detailed model of synaptic plasticity which is considered to be the basis of learning and memory. The model demonstrates that many features of plasticity can be accounted for by the synaptic calcium signal. Showed that the model behavior can be calculated analytically using a mean-field approach.

- Cotutelle (binational PhD), supervised by Nicolas Brunel (Paris) and Frank Jülicher (Dresden)
- Grade: magna cum laude (Germany), très honorable (France)

Oct 1997 – Jul 2003 **Masters in Physics**

Dresden University of Technology (Germany)

- Diploma Thesis project in Computational Neuroscience : Calcium dynamics in synapses
- Specialized in Particle Physics and studied one year at the University of Edinburgh, UK (Oct 2000 – Jun 2001) to develop software for data acquisition and to take courses in quantum field theory
- Degree has a strong emphasis on Math for physicists
- Grade: 1.15 (minimum 6.0, maximum 1.0)

Current Position

Oct 2015 - present **Researcher (CNRS CRCN)**

Saints-Pères Paris Institute for the Neurosciences (SPPIN), CNRS, Université de Paris (France)

- Investigating activity patterns and the role of the interneuron network in the molecular layer of the cerebellum in locomoting mice using calcium imaging, electrophysiology and computational modeling.

Experience

Aug 2014 – Sep 2015 **postdoctoral fellow in experimental neuroscience**

Laboratoire de Physiologie Cérébrale, Université Paris Descartes, Paris (France)

- Working with Isabel Llano.
- Studying the the link between molecular layer interneuron activity and the associated calcium signal *in vivo* using calcium imaging and electrophysiology.

Aug 2009 – Jun 2014 **postdoctoral fellow in computational and experimental neuroscience**

New York University, New York (USA)

- Working with Alex D. Reyes.
- Investigated correlations between synaptic inputs to neurons and found that neural networks are organized to suppress noise.
- Started to do experiments first *in vitro* - whole-cell patch clamp recordings - and later *in vivo* - whole-cell patch clamping and 2-photon calcium imaging.
- Mounted a new setup in the lab and introduced the experimental technique of *in vivo* whole-cell recordings combined with 2-photon imaging.

Nov 2007 – Jun 2009 **postdoctoral fellow in computational neuroscience**

École Normale Supérieure, Paris (France)

- Working with Boris Gutkin.
- Investigated the action of Nicotine in the brain, in particular its influence on dopamine signaling which plays a major role in reward-motivated behavior. The developed biophysical model reveals different routes of Nicotine leading to dopamine increases.
- Responsible for computing cluster.

Grants & Fellowships

Oct 2024 - Sep 2027 **ANR PRC 2024**

SPPIN, CNRS, Université de Paris (France)

- Project financed : Distributed cerebello-cortical learning in locomotor adaptation – "CereCore-Locomotion" (307 k€)
- I am the scientific coordinator of the project which involves a collaboration with Dr. Alex Cayco Gajic at the ENS, Paris.

Sep 2024 - Aug 2026 **Émergence Recherche, Idex Université Paris Cité**

SPPIN, CNRS, Université de Paris (France)

- Project financed : Unraveling animal behavior through decoding of non-invasive, continuous measurements – "ContiBehavior" (23,6 k€)
- I am the scientific coordinator of the project which involves a collaboration with Dr. Chloé Berland (Centre Borelli, UPCite) and Dr. Boris Lamotte d'Inchamps (SPPIN, Paris) and .

Apr 2022 - Mar 2025 **FLAG-ERA JTC 2021 – HBP**

SPPIN, CNRS, Université de Paris (France)

- Project financed : The role of GABAergic neuron subtypes in stabilizing and flexibly resetting head-direction signals in the Presubicular cortex – "VIPattract" (207 k€)
- I am one partner in an European research consortium including labs in France, the Netherlands, Hungary and an associated lab in Japan.

Sep 2019 - Dec 2020 **Emergence en Recherche de l'IdEx Université de Paris**

SPPIN, CNRS, Université de Paris (France)

- Project financed : Fine scale population imaging of head direction activity during free spatial exploration (ANR-18-IDEX-0001, POPiHD, 30 k€)
- Collaborative grant with Desdemona Fricker (Integrative Neuroscience and Cognition Center, Université Paris Descartes, France).

Oct 2018 - Sep 2023 **ANR Jeunes Chercheurs Jeunes Chercheuses (JCJC)**

Laboratoire de Physiologie Cérébrale, Université Paris Descartes (France)

- Project financed : Cerebellar molecular layer interneuron network activity and function during walking and obstacle crossing – "WalkingCrossingNeurons" (ANR-18-CE37-0006-01, 388 k€)

Aug 2014 - Jan 2015 **Postdoctoral fellowship of the École des Neurosciences de Paris**

Laboratoire de Physiologie Cérébrale, Université Paris Descartes (France)

Sep 2010 - Aug 2013 **Feodor Lynen Fellowship of the Alexander von Humboldt Foundation**

Center for Neural Science, New York University, New York (United States)

Oct 2008 - Jun 2009 **Postdoctoral fellowship of the École des Neurosciences de Paris**

Group for Neural Theory, École Normale Supérieure, Paris (France)

Sep 2005 - Jul 2006 **Eiffel Excellence scholarship of the French Ministry for Foreign Affairs**

Laboratoire de Neurophysique et Physiologie, Université Paris Descartes (France)

Jan 2004 - Jun 2005 **Scholarship of the Deutscher Akademischer Austausch Dienst (DAAD) and the French Government**

Laboratoire de Neurophysique et Physiologie, Université Paris Descartes (France)

Supervision of Students and Post-docs

May 2025 **Paris spring school: Optical Imaging and Electrophysiological Recording in Neuroscience**

UFR Biomédicale, Université Paris Descartes, Paris (France)

- I am the local organizer of this Spring School attracting $\sim$ 24 international students for a 14-day residential course of lectures, demonstrations and practical work.
- Within the course, I am providing and 6 day long (2 days per group of students) hand-on workshop on using miniscopes.

Oct 2024 - present **PhD supervisor**

SPPIN, Université Paris Cité (France)

- Margaux Le working on the project : Cerebellar motor learning and control during obstacle crossing of locomoting mice.

Oct 2022 - present **PhD supervisor**

SPPIN, Université Paris Cité (France)

- Elja Belhadef working on the project : Imaging of head direction neurons and interneurons in the presubiculum of freely behaving mice.

Sep 2021 - present **PhD supervisor**

SPPIN, Université de Paris (France)

- Marin Dauguet working on the project : Investigating neuronal activity underlying the sensory control of head direction signals using Neuropixel probes.
- co-supervision with Desdemona Fricker (INCC, Université de Paris, France).

Sep 2021 - Aug 2023 **Post-doc supervisor**

SPPIN, Université Paris Cité (France)

- Andry Andrianarivelo working on the "Cerebellar molecular layer interneuron network activity and function during walking and obstacle crossing" project.

May 2021,22,23 **Paris Spring School : committee member and teaching assistant**

SPPIN, Université Paris Cité (France)

- organizing the "Optical Imaging and Electrophysiological Recording in Neuroscience".
- providing the Miniscope hands-on tutorial .

Jan 2015 - present **Supervisor of graduate students**

Laboratoire de Physiologie Cérébrale (now SPPIN), Université Paris Descartes

- Jan-Jul 2024 : supervised Margaux Rouffiange (BIP M2 student) working on the cerebellar role in locomotion on flat vs. challenging surfaces.
- Jan-Jul 2023 : supervised Margaux Le (Neuroscience M2 student) working on the cerebellar role in motor adaptation in form of a sudden obstacle during locomotion.
- Apr-Jul 2023 : supervised Oriane Demandolx (Neuroscience M1 student) working on extracting and characterizing the usage of whiskers during the acquisition of a complex locomotor task.
- Apr-Jul 2022 : supervised Razmig Derounian (Neuroscience M1 student) working on the analysis of Purkinje cell complex spike activity during the acquisition of a complex locomotor task.
- Jan-Jul 2022 : supervised Maria Fernanda Niño Uribe (BME M2 student) working on the role of the cerebellar interneuron network during the learning of a complex locomotion task.
- Jan-Jul 2019 : supervised the Jérémy Gabillet (BIP M2 student) working on the role of the cerebellar interneuron network during the learning of a complex locomotion task.
- Jan-Jul 2018 : supervised Kiefer Korvin (BIP M2 student) working on learning of a complex locomotion task on the treadmill. between synaptic plasticity and behavior.
- Jan-Sep 2017 : co-supervised with Srdjan Ostojic (ENS, Paris) Athur Berrou (CogMaster M2 student) working on modeling the link between synaptic plasticity and behavior.
- Co-supervised seven M1 and M2 students during the "Tutorats Interdisciplinaires en Neurosciences" (TINS) autumn module of the IMaLiS Masters (1 in 2015, 3 in 2016, 1 in 2017, 2 in 2018).

Aug 2009 - Jun 2014 **Mentor**

New York University, New York (USA)

- Supervised one graduate student during his PhD in Alex D. Reyes' laboratory. Taught this student how to perform whole-cell patch-clamp recordings *in vivo*.

Aug 2010 **Tutor**

15th Advanced Course in Computational Neuroscience (ACCN), Freiburg (Germany)

- Supervised master and postgraduate students working on individual projects during the summer course.

Apr 1999 - Feb 2003 **Teaching assistant**

Dresden University of Technology (Germany)

- Tutored undergraduate students attending the lecture "Theoretical Electrodynamics" and during their physics laboratory sessions

Teaching (full university courses)

Sep - Dec 2019-2024 **Neural Data Science with Python**

UFR Biomédicale, Université Paris Descartes, Paris (France)

- Conceived and organized the mandatory course of students following Masters in Neuroscience program of the Unviversité de Paris, 3 ECTS points.
- Course teaches basic and advanced data analysis concepts including machine learning approaches applied to Neuroscience data.
- Course features three external lecturers, personal teaching volume : 16 h distributed over 8 courses per year : 0.75 h lecture and 1.25 h tutorial.
- Course website (2021 course): https://github.com/mgraupe/DataSciPy2021

Oct 2019-2024 **Sys. Neurosci. : Motor adaptation and sensory prediction in the Cerebellum**

Faculté des Sciences Fondamentales et Biomédicales, Université Paris Descartes, Paris

- Taught to Master II Neuroscience students.
- Teaching volume : 2 lectures (4h) per year.

Sep 2019-2024 **Neuroimaging: In vivo imaging on awake animals**

Faculté des Sciences Fondamentales et Biomédicales, Université Paris Descartes, Paris

- Taught to Master II Neuroscience students.
- Teaching volume : 1 lectures (1h30) per year.

Oct 2017-2024 **Introduction to computational neuroscience : from single neurons to networks**

Faculté des Sciences Fondamentales et Biomédicales, Université Paris Descartes, Paris

- Taught to Master II Neuroscience students.
- Teaching volume : 2 lectures (4h) per year.

Oct 2015-2024 **Synaptic plasticity: Spike-timing dependent plasticity (STDP)**

Ecole Normale Supérieur, Paris (France)

- Taught Master I IMaLiS students choosing the Synaptic foundations of network function module.
- Teaching volume : one lecture (2h) per year.

Oct - Dec 2016, 2017 **Introduction aux Neurosciences Computationnelles**

UFR de Mathématiques et Informatique, Université Paris Descartes, Paris (France)

- Taught Licence 3 MATH/INFO students taking Biologie in the autumn semester.
- Course was taught in French.
- Teaching volumne : 24 h distributed over 8 courses per year : 1.5 h lecture and 1.5 h tutorial.

Apr 1999 - Feb 2003 **Teaching assistant**

Dresden University of Technology (Germany)

- Tutored undergraduate students attending the lecture "Theoretical Electrodynamics" and during their physics laboratory sessions.

Institutional Responsibilities

Jul 2024 - present **Sustainable Development Coordinator at the SPPIN lab**

SPPIN, CNRS, Université Paris Cité, Paris

Jan 2024 - present **Scientific Manager of the Prototyping Platform of BioMedTech Facilities (INSERM US36, CNRS UAR2009)**

Université Paris Cité, Paris

Jul 2023 - present **President of the Animation Committee organizing scientific and social events at the SPPIN laboratory**

Faculté des Sciences Fondamentales et Biomédicales, Université Paris Cité, Paris

Sep 2021 - present **Elected member of the Conseil Scientifique Locale (CSL)**

Faculté des Sciences Fondamentales et Biomédicales, Université Paris Cité, Paris

Dec 2017 - Jun 2021 **Elected member of the Conseil de Gestion**

Faculté des Sciences Fondamentales et Biomédicales, Université Paris Descartes, Paris

Sep 2018 - present **Member of the scientific council of the animal facilities**

Faculté des Sciences Fondamentales et Biomédicales, Université Paris Cité, Paris (France)

Jun 2016 - 2019 **Member of the scientific council for the Neuroscience Seminar series**

Fédération de Recherche en Neurosciences, Université Paris Descartes, Paris (France)

Sep 2012 - Jun 2013 **Organizing the Auditory Journal Club "EARS"**

Center for Neural Science, New York University, New York (United States)

Courses taken

Nov 2017 **Formation expérimentation animale de niveau II : Chirurgie, CNRS**

Nov 2016 **Formation expérimentation animale de niveau I : concepteur rongeur, CNRS**

Jul 2009 **Optical Imaging and Electrophysiological Methods in Neuroscience**
École des Neurosciences de Paris Île-de-France, Paris (France)

Aug 2005 **Advanced Course in Computational Neuroscience Arcachon (France)**

Memberships

since Aug 2005 **Member of the Society for Neuroscience (SfN)**

since Apr 2022 **Member of the Société des Neurosciences**