SensoMotion lab – Paris-Saclay Institute of Neuroscience (NeuroPSI)

Postdoc POSITION

How does movement affect sensory perception? The SensoMotion lab is looking for a highly motivated postdoc candidate to use cutting edge microscopy and electrophysiological tools to dissect the circuits of the brain that allow us to seamlessly interpret our sensory inputs while we are moving through the world.

Title: Correcting for Self: Investigating the Neural Circuits Underlying the Integration of Visual and Self-Motion Signals in the Mouse Visual Cortex.

Description: The SensoMotion lab at the Paris-Saclay Institute of Neuroscience is seeking a highly motivated postdoc candidate to join a research project funded by the ERC Starting grant. The successful candidate will combine behavior, optogenetics, and cutting-edge 2Photons microscopy (voltage and calcium) and electrophysiological tools to determine the neural circuits that allow the brain to seamlessly interpret sensory inputs while we are moving through the world. The candidate will join a supportive and multi-disciplinary research environment, collaborating with computational neuroscientists and interacting with experts in the fields of sensory processing and sensory-motor integration.

Sensory systems are our access to the external world. As we are often moving, a significant fraction of our sensory stimulation is generated by our own actions, rather than by changes in the environment. The brain must distinguish if a sound or a visual cue has been generated by its own action, or triggered by an incoming danger. Thus, to form an accurate representation of the world it is critical that the brain distinguishes between self- and externally-generated sensory stimuli. However, we still know remarkably little about how sensory areas combine self- and externally-generated sensory stimuli to build an accurate internal model of the world. For example, the visual cortex has been mostly studied by presenting visual stimuli to head-fixed animals. While this approach has revealed key principles of visual processing, restricting self-motion does not account for a major aspect of sensory processing, namely head motion and orientation. Recently, we found that head movement affects the neuronal activity across all cortical layers in the primary visual cortex (V1) of mice, even in the absence of visual stimuli (Bouvier et al., 2020). This result suggests that head movement can affect even the earliest stage of perceptual processing and it raises the question of how such modulation impacts visual processing. Capitalizing on previous research and my lab expertise in both the cerebello-vestibular and visual system, this project aims to understand this unexplored aspect of self-motion during visual processing, at both the cellular and systems levels.

To this aim, this project will determine the circuit mechanisms and neuronal computations involved in the integration of self-motion related signals with visual inputs in the visual system; Achieving these goals relies on a multidisciplinary experimental strategy based on cutting-edge approaches to monitor and control circuit

activity with high spatio-temporal resolution in a cell-type specific manner, neuroanatomical tracing, and computational modelling. This experimental strategy combined with research the background of the lab in visual and vestibular systems provides a unique opportunity to understand unexplored aspects of sensory processing, at both the cellular and systems levels. Altogether, this project will reveal a novel framework to understand how sensory processing operates during self-motion.

Qualifications: Applicants should have completed (or be about to submit) a PhD in neuroscience, engineering, or a related discipline. We are looking for someone with previous experience in electrophysiology or two-photon imaging/ and strong data analysis skills (Matlab/Python required).

Application Process: Interested candidates should contact Dr. Guy Bouvier at guy.bouvier@cnrs.fr and include a CV, cover letter, and the contact details of two referees. Applicants should also provide a brief statement (1 page maximum) describing their future research ambitions and the questions and approaches they consider important for studying visual perception during self-motion. The position is open from January 2024. For an informal discussion about the position, please do not hesitate to reach out via email.

The Paris-Saclay, Institute of Neuroscience (NeuroPSI**)** is an institute dedicated to fundamental research in neuroscience at Paris-Saclay University (#1 university in France; 25 km South-West of Paris). The NeuroPSI research groups are organized in three thematic departments and address a wide range of questions in neuroscience, from molecules to cognition and from embryos to adults, using multiscale experimental and theoretical approaches. NeuroPSI recently moved to a brand-new building next to the NeuroSpin institute for brain imaging, thus forming the largest neuroscience cluster in the Paris area.

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