



MASTER 2 Fundamental and Clinical Neurosciences

Internship proposal 2024-2025

(internship from January to June 2025)

Host laboratory: *Institut des Sciences Cognitives*

Host team : NeuroPrime Team

www.neuroprime.org

Internship supervisors : Sylvia Wirth

Research Director

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Project title :

Role of posterior cingulate cortex during virtual navigation in the macaque

Project summary : *approx 10 lines*

Wayfinding is essential to every living creature. This proposal aims to determine the neural basis of navigation, in cortical structures projecting on the hippocampus. We will focus on characterizing activity in retrosplenial and posterior cingulate cortices with the hypothesis that these areas integrate egocentric navigation into an allocentric frame of the world. We will carry neural recordings while non-human primates navigate an environment in virtual reality as it permits experimental control of the sensory visual input. By analyzing neural activity in these regions, we will determine the functional properties of the cells that allow to represent external stimuli with respect to self or relative to each other. The results will document neural mechanisms taking place in cortical areas that interface regions processing visual input and hippocampus, which is the center of memory including spatial memory. The results will therefore shed light on the way a neural map of the external world is constructed.

3-5 recent publications :

Marie Vericel, Pierre Baraduc, Jean René Duhamel, Sylvia Wirth. Linking place and view: Organizing space through saccades and fixations between primate posterior parietal cortex and hippocampus bioRxiv 2023. doi: <https://doi.org/10.1101/2023.11.06.565451>

Wirth S. A place with a view: A first-person perspective in the hippocampal memory space. 2023, *Hippocampus*. 33:658-666. doi: [10.1002/hipo.23537](https://doi.org/10.1002/hipo.23537)

Baraduc P, Duhamel JR, Wirth S. Schema cells in the macaque hippocampus. *Science*. 2019 Feb 8;363(6427):635-639. doi: [10.1126/science.aav5404](https://doi.org/10.1126/science.aav5404). PMID: 30733419.

Rolls ET, Wirth S. Spatial representations in the primate hippocampus, and their functions in memory and navigation. *Prog Neurobiol*. 2018 Dec;171:90-113. doi: [10.1016/j.pneurobio.2018.09.004](https://doi.org/10.1016/j.pneurobio.2018.09.004). Epub 2018 Sep 13. PMID: 30219248.

Wirth S, Baraduc P, Planté A, Pinède S, Duhamel JR. Gaze-informed, task-situated representation of space in primate hippocampus during virtual navigation. *PLoS Biol*. 2017 Feb 27;15(2):e2001045. doi: [10.1371/journal.pbio.2001045](https://doi.org/10.1371/journal.pbio.2001045). PMID: 28241007; PMCID: PMC5328243.