

MASTER 2 Fundamental and Clinical Neurosciences

Internship proposal 2025-2026

(internship from January to June 2026)

Host laboratory: **Lyon Neuroscience Research Center.**

Host team : **Forgetting Team**

Internship supervisors : **Jean-Christophe COMTE / IR HDR / jean-christophe.comte@cnrs.fr**

Project title : **Analysis of the Rapid Dynamics of Synaptic Connectivity and Its Impact on Brain Activity.**

Project summary :

We have recently demonstrated in rats (cf. *Dynamics of evoked responses in hippocampal pathways are encoded by the duration of vigilance states*, P. Marchal et al., *Nature Communications*) that synaptic dynamics are oscillatory and controlled by sleep-wake cycle dynamics, similar to pulse duration modulation. Our research has highlighted these oscillations on a timescale of about ten minutes. However, faster dynamics may exist, influenced by physiological parameters such as heart rate, respiration, or temperature.

In this context, we propose an internship aimed at further analyzing these rapid dynamics and examining their impact on the activity of simultaneously recorded brain regions.

3-5 recent publications :

P. Marchal, P. A. Salin, M. Missaire, M. Rampon, J. Carponcy, R. Parmentier, G. Malleret & **JC Comte** « *Dynamics of evoked responses in hippocampal pathways are encoded by the duration of vigilance states* » *Nature Commun.* (2025).

S.Benkeder, S.M. Dinh, P. Marchal, P. De Gea, M.Thoby-Brisson, V.Hubert, I.Hristovska, G.Pitollat, K.Combet, O. Pascual, **J.C. Comte**, « MorphoCell-Sorter : An Andrews plot-based sorting approach to rank microglia according to their morphological features », *eLife*, (2024).

Rampon M, Carponcy J, Missaire M, Bouet R, Parmentier R, **Comte JC**, Malleret G, Salin PA. Synapse-Specific Modulation of Synaptic Responses by Brain States in Hippocampal Pathways. *J Neurosci.* 2023.

Hristovska, I., Robert, M., Combet, K , **J.C. Comte** and Pascual O., . « Sleep decreases neuronal activity control of microglial dynamics in mice. *Nat Commun* 13, 6273 (2022)

V. Hubert,I. Hristovska,S. Karpati, S. Benkeder, C. Dumot, C. Amaz, N. Chounlamountri, C. Watrin, **J.C. Comte**, F. Chauveau, E. Brun, F. Le-rouge, S. Parola, Y. Berthezène, O. Pascual, M. Wiart,« Multimodal imaging with NanoGd reveals spatiotemporal features of neuroinflammation after experimental stroke Biomaterials » , *Advance Science*, (2021)