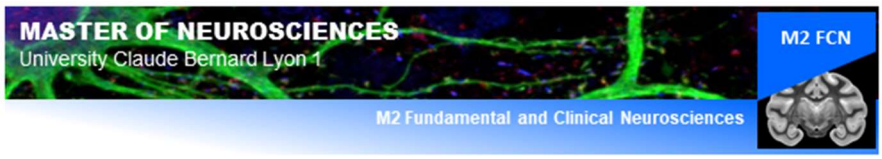

Université Claude Bernard Lyon 1

MASTER 2 Fundamental and Clinical Neurosciences

Internship proposal 2025-2026

(internship from January to June 2026)

Host laboratory: Lyon Neuroscience Research Center CRNL. Inserm U1028 - CNRS UMR5292 - UCBL.

Host team : Tiger Team https://www.crnl.fr/en/equipe/tiger; Cophy Team, https://cophyteam.fr/

Internship supervisors :

Vincent MAGLOIRE, Researcher Inserm, vincent.magloire@inserm.fr;

Elif KÖKSAL-ERSÖZ, Researcher Inria, elif.koksal@inria.fr

Project title : Role of interneurons in seizure control

Project summary : Seizures are intricate pathological events in neural networks, marked by excessive and synchronized neuronal activity, including a wide variety of inhibitory interneurons. Normally, inhibitory interneurons function to regulate brain excitation, but this system sometimes fails, leading to uncontrolled excitation. Recent advances in optogenetics, along with genetic tools, electrophysiological methods, and imaging techniques, have made it possible to examine the specific contributions of certain cell types to network dynamics. While these techniques have significantly enhanced our understanding of cortical circuits in epilepsy, the specific roles of different inhibitory cell types in seizure control are still not fully understood.

This internship will focus on the role of different types of inhibitory interneurons on seizure suppression. The objective is to model in vivo recordings with a recent neural mass model and to decipher the role of different types of interneurons during seizures and how their anti-epileptic action can be activated. Familiarity with dynamical systems, mathematical models, neurophysiology and proficiency with Python are required.

Recent publications :

1. V. Magloire, M.S. Mercier, D.M. Kullmann, I. Pavlov. GABAergic Interneurons in Seizures: Investigating Causality With Optogenetics. Neuroscientist. 2019 Aug 1;25(4):344–58.
2. E. Köksal Ersöz, J. Modolo, F. Bartolomei and F. Wendling. Neural mass modeling of slow-fast dynamics of seizure initiation and abortion. PLoS Comput. Biol., 16(11): e1008430, 2020.
3. E. Köksal-Ersöz, M. Yochum, P. Benquet, F. Wendling. eCOALIA: Neocortical neural mass model for simulating electroencephalographic signals, SoftwareX, 28: 101924, 2024.