

## MASTER 2 Computational Neurosciences

### Internship proposal 2025-2026

(internship from January to June 2026)

**Host laboratory:** Institut des Sciences Cognitives, UMR 5229 CNRS/UCBL, 67 Bd Pinel, 69675 Bron, France (<http://isc.cnrs.fr>)

**Host team :** Decision, Action, and Neural Computation (DANC) team (<https://www.danclab.com/>)

**Internship supervisors :** James Bonaiuto, Chargé de recherche  
University / Institution: CNRS/ University Lyon 1  
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#### **Project title : Functional role of cortical beta activity in naturalistic actions**

**Project summary :** Each of us performs thousands of motor actions during the course of daily tasks, ranging from relatively simple (e.g. clicking on a mouse button), to highly complex (e.g. holding a sheet of paper in one hand while using scissors to cut it in a straight line with the other). It is well established that the primary motor cortex is directly and intimately involved in many of these mechanisms, and it is often viewed as the primary ‘output’ region of the neocortex. Motor cortical activity in the beta frequency range (13-30Hz) is a hallmark signature of healthy and pathological movement, but its behavioral relevance remains unclear. This project will determine the functional role of beta bursts in naturalistic behavior by using magnetoencephalography (MEG) and electroencephalography (EEG) to study beta activity in adult human subjects performing reaching and grasping movements. This will be combined with deep learning neural networks for reconstructing the three-dimensional kinematics of the hand from multiple video cameras. The results of this project are expected to provide a foundational understanding of the mechanisms linking beta activity to behavior, laying the groundwork for targeted treatments for diseases of movement which are associated with pathophysiological beta activity, including Parkinson’s disease.

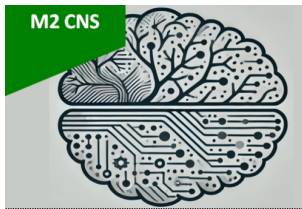
#### **Related publications :**

Bonaiuto, J.J., Little, S., Neymotin, S.A., Jones, S.R., Barnes, G.R., Bestmann, S., 2021. Laminar dynamics of high amplitude beta bursts in human motor cortex. *NeuroImage* 242, 118479.

Papadopoulos, S., Darnet, L., Szul, M.J., Congedo, M., Bonaiuto, J.J., Mattout, J., 2024. Surfing beta burst waveforms to improve motor imagery-based BCI. *Imaging Neuroscience*.

Rayson, H., Szul, M.J., El-Khoueiry, P., Debnath, R., Gautier-Martins, M., Ferrari, P.F., Fox, N., Bonaiuto, J.J., 2023. Bursting with potential: How sensorimotor beta bursts develop from infancy to adulthood. *J. Neurosci*.

Please send your proposal to [matteo.divolo@univ-lyon1.fr](mailto:matteo.divolo@univ-lyon1.fr) for publication on the Master of Neuroscience website.



Szul, M.J., Papadopoulos, S., Alavizadeh, S., Daligaut, S., Schwartz, D., Mattout, J., Bonaiuto, J.J., 2023. Diverse beta burst waveform motifs characterize movement-related cortical dynamics. *Progress in Neurobiology* 228, 102490.