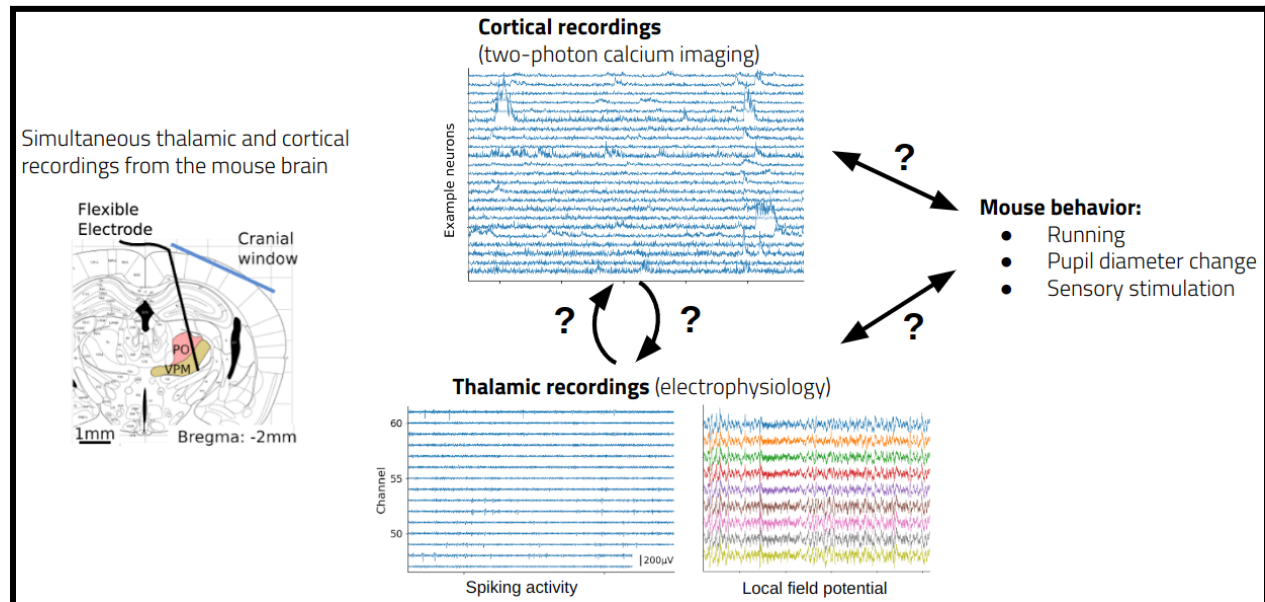


Master Thesis Project: Analyzing thalamo-cortical interactions with simultaneously acquired electrical and optical recordings



Background:

Brain activity is organized across spatial and temporal scales. Understanding principles of these multiscale dynamics requires simultaneous monitoring of signals in multiple, distributed network nodes (see [review](#)). We have recently recorded a dataset with optical recordings from the cortex and simultaneous electrical recordings from the thalamus of the mouse brain (in collaboration with Baran Yasar, Prof. Fatih Yanik lab). In this project, you would analyze a part of this dataset under the supervision of Adrian Roggenbach and Dr. Chris Lewis in the laboratory of Prof. Fritjof Helmchen ([lab website](#)).

Goals:

- Examine the relationship between thalamic neural activity and cortical activity patterns
- Develop analysis methods to combine electrical (spike+LFP), optical (two-photon, widefield) and behavioral (body movements, pupil, whiskers) recordings

Methods:

- Use and further develop an analysis pipeline with DataJoint ([Link](#))
- Time series analysis and interactive visualization
- Cross-modal predictive models (e.g. [GLMs](#) or [deep neural networks](#))
- Unsupervised clustering (e.g. [time-invariant](#) or [hidden-Markov models](#))

Requirements:

- Programming experience in Python
- Interest in neuroscience and data analysis

Details:

- Project duration 3 to 9 months, flexible starting date
- Applications should include a short statement of research interest and a CV

Contact:

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