

Postdoc in machine learning for large-scale brain network models.

A post doc position is available at the Institut de Neurosciences des Systèmes (<http://ins-amu.fr/>), Aix-Marseille University, France

Summary: The Theoretical Neuroscience Group (Head: Viktor Jirsa) is seeking to fill a post-doctoral position in the context of the project Virtual Brain Cloud to work on development of parameter inference workflows for connectome-based large-scale brain network models (see The Virtual Brain <http://www.thevirtualbrain.org>) applied to brain imaging data (EEG, MEG, fMRI). In particular, the project will involve the application and evaluation of Bayesian estimation techniques such as Markov-Chain Monte-Carlo and Hamiltonian Monte-Carlo algorithms to high-dimensional biophysical and phenomenological time-series models based on ODE/SDE involving latent state-space variables. These were previously successfully applied in the context of estimation of brain excitability based on personalized brain models and SEEG recordings of seizure propagation in epileptic patients. The project requires inverting the in-vitro and in-vivo datasets in bayesian setup for brain network models and providing posterior distributions of the inferred parameters. The issues of degeneracy in the models based on the posterior estimates will also be addressed using the state-of-the-art bayesian inference techniques. The successful candidate will join a team working towards generalizing these approaches for other paradigms such as stimulation, resting state and aging.

Qualification: Candidates should have a strong background in data fitting (Bayesian inference approaches, Dynamical Causal Modeling (DCM), Monte Carlo techniques). Experience with computational neuroscience (networks, dynamic system theory) and ability to program in Probabilistic programming languages such as Stan, Turing etc will be preferred. The candidate should have some experience in working with R/Python/MATLAB/Julia.

The Theoretical Neuroscience Group: We are a multi-national and interdisciplinary team interested in understanding the mechanisms underlying the spatiotemporal organization of large-scale brain networks. Our work comprises mathematical and computational modeling of large-scale network dynamics and human brain imaging data, the development of neuroinformatics tools for studying large-scale brain networks applied to concrete functions, dysfunctions (epilepsy, dementia) and aging.

Terms of salary and employment

The contract is 1 year, renewable, with salary based on experience.

Starting date: September 2021

Please contact Lisa Otten (lisa.otten@univ-amu.fr) with a letter of motivation and CV, and arrange for two letters of reference.