

HIRING FOR THESE POSITIONS HAS BEEN CLOSED. THANK YOU!

Open Ph.D. Position in Computational Neuroscience
Laboratory for Integrative Neuroscience Analyses
Department of Computer Science and Engineering
University of South Carolina

The Laboratory for Integrative Neuroscience Analyses (LINA), directed by Dr. Christian O'Reilly, is looking to fill two open Ph.D. positions. These positions will be fully funded for four years by a Graduate Research Assistantship (GRA) on an NSF project titled "Multiscale Model-Driven Analysis of the Brain and its Disorders". The preferred starting date is on January 5th, 2026.

The project: The brain is a tremendously complex system operating at multiple spatiotemporal scales. No framework has proved versatile and powerful enough to integrate the heterogeneous sources of information required to understand this system across scales. This project proposes a novel model-driven approach to address these gaps. Specifically, it will implement a multiscale forward model linking cellular mechanisms with whole-brain dynamics, integrating spiking neural networks and neural masses using co-simulation (Aim 1). It innovates by conceptualizing and implementing a framework informing macroscopic analyses (e.g., EEG) from microscale mechanisms constrained by mesoscale organizational principles. Further, it will leverage deep Bayesian learning for model parameter inference from simulated EEG, demonstrating that physiologically relevant latent variables can be studied from experimental data using multiscale, integrative modeling (Aim 2). The power of this model-driven approach will be illustrated using EEG recorded in genetically-defined groups to investigate whether the imbalance in excitatory/inhibitory ratio in autism is associated with a breakdown in long-range effective connectivity, a use case of crucial relevance for understanding neural mechanisms and their dysregulation in autism (Aim 3). By using deep Bayesian learning for multiscale inference, this project is expected to alleviate scalability issues with traditional approaches and have a transformative effect on computational neuroscience methods and neuroscience data analysis.

Research Environment: The overarching research objective at [LINA](#) is to develop principled, model-driven approaches for multi-scale analysis to better understand the brain across spatial and temporal scales and address complex neurodevelopmental issues such as autism and other neurodevelopmental disorders. We believe in

collaborative and open science and harness the highly expressive and powerfully featured Python ecosystem to deploy accessible and agile software. We use different methodological approaches, including analytical techniques (e.g., EEG source reconstruction, functional connectivity) and modeling (e.g., point neurons, morphologically-detailed neurons, neural masses), as well as the combination of these two approaches through Bayesian model-driven analyses. As a part of the [Artificial Intelligence Institute](#) and the [Department of Computer Science and Engineering \(CSE\) of USC](#), we also seek to develop novel ways to empower the study of neuroscience through AI and to empower AI through biologically inspired neural networks. LINA students also benefit from our affiliation with the [Carolina Autism and Neurodevelopment Research Center](#) and the [Institute for Mind and Brain](#). The students will work under the direct supervision of [Dr. O'Reilly](#).

Duties and Responsibilities:

- Reviewing the relevant literature
- Write Python code for neural simulations (spiking neurons, neural masses), inference (Bayesian inference, Deep-Learning), and data analysis
- Writing scientific publications and communicating results at conferences
- Managing and releasing code through GitHub, including related DevOps
- Other administrative, technical, or scientific tasks, as required by the project's objectives.

Required Qualifications:

- Record of academic excellence (minimum 3.5/4.0 GPA)
- Meeting the qualification for our Ph.D. program: <https://cse.sc.edu/graduate/admissions>
- Strong Python coding and software development skills
- Strong communication and organizational skills; attention to detail
- Excellent social skills and a keen interest in [computational neuroscience](#), interdisciplinary projects, and collaborative work
- Good spoken and written English
- Being highly motivated, creative, and good at problem-solving

Preferred Qualifications, but not mandatory:

- Knowledge of computational neuroscience, neuroscience, or neuroimaging
- Familiarity with EEG
- Experience with MNE-Python
- Knowledge/experience with Dynamic Causal Modeling
- Experience with modeling, analysis of complex systems, and simulation

To Apply: Please send your CV or resume, academic transcripts, a cover letter explaining your interests and fit to the position, and contact information of 3 professional references to Dr. O'Reilly (christian.oreilly@sc.edu), with the subject line "Ph.D. Research Assistant Application - Computational Neuroscience". Please direct any questions about this position to Dr. Christian O'Reilly (christian.oreilly@sc.edu).

Note: Official admissions to the Ph.D. are under the purview of the CSE department, but LINA will support the selected student through this process, and, upon admission, the student will be offered GRA support.