The USC Mark and Mary Stevens Neuroimaging and Informatics Institute and Laboratory of Neuro Imaging (INI, www.ini.usc.edu) are world leaders in the development of advanced computational and scientific approaches for the comprehensive mapping of brain structure and function. LONI's unique multidisciplinary environment and cutting edge resources allow for integration of clinical, psychological, and genotypic information with neuroimaging phenotypes for research questions in neurology, psychiatry, and developmental neurobiology.

Dr. Duncan is an Assistant Professor of Neurology at LONI. She has a background that spans mathematics and neuroscience as well as a long history of epilepsy research. Her work combines electrical engineering, mathematics, and neurology. She has focused on applying mathematical tools, such as nonlinear factor analysis, to intracranial EEG data for applications such as the detection of seizure onset as well as resting state networks. She has also developed novel dimensionality reduction techniques to study Alzheimer's disease using MRI data. Her current work focuses on developing new analytic tools for EEG data to study posttraumatic epilepsy and linking that data to MRI. The innovative mathematical and statistical techniques that she has developed show significant, promising contributions to visualize complex associations among multiple variables. Additionally, she has also developed and used virtual and augmented reality technology for both data visualization and interaction.

The postdoc will be working on the Epilepsy Bioinformatics Study for Antiepileptogenic Therapy (EpiBioS4Rx), the goal of which is to identify relevant biomarkers of epileptogenesis after traumatic brain injury to be used for antiepileptogenic therapies. The postdoc will use various quantitative and data mining methods on longitudinal multimodal data, in particular, EEG and MRI, with the goal of identifying these biomarkers. Innovative methods will be used to understand interrelationships between EEG and MRI. SVM, sparse regression, deep learning frameworks, and other related methods will be applied to continuous EEG data to identify patterns or abnormal epileptiform activity to study posttraumatic epilepsy. The postdoc will work on denoising the data using various filtering techniques and comparing scalp EEG and intracranial EEG. DTI will be analyzed to extract connectivity between all pairs of gyral and sulcal structures in the presence of brain trauma. Connectivity between all brain regions will be assessed systematically within patients for multimodal coregistration of MRI. Data from humans will be compared with data from rats.

Preferred Qualifications:

- Ph.D. in electrical engineering, computer science, mathematics, physics, or related areas
- Strong Research skills
- Ability to work independently
- Good communication skills
- High level of motivation
- Effective problem solving/critical thinking skills
- Expertise in MATLAB
- EEG and MRI analysis, proficiency in signal processing and image processing tools in Matlab
- Machine learning techniques, such as convolutional neural network
- Strong publication record
  Minimum education: Ph.D. or equivalent doctorate within previous three years
  Minimum experience: 0-1 year
  Minimum field of expertise: Directly related education in research specialization with advanced knowledge of equipment, procedures and analysis methods.

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