

Medical Student Research Opportunity

Analysis of Invasive and Non-invasive Electrophysiology to Explore the Neural Mechanisms of Brain Plasticity



The **Keller Lab @ Stanford University** (kellerlab.stanford.edu) has multiple NIH-funded research opportunities for highly motivated medical students to conduct translational research at the intersection of neuroscience, electrophysiology, brain stimulation, engineering, psychiatry, clinical trials, and precision neurotherapeutics. Join us as we scale up our efforts to better understand how to modulate human brain circuits and develop novel treatments to improve mental illness!!

Using neuroimaging and electrophysiological techniques, the goal of Dr. Keller's Laboratory is to improve Transcranial Magnetic Stimulation (TMS) by better understanding the *fundamental principles of human brain plasticity* and *building trans-diagnostic real-time monitoring platforms for personalized brain stimulation*. TMS is a non-invasive brain stimulation technique that is FDA-approved for depression, OCD, migraines, and smoking cessation, with clinical trials underway for PTSD, addiction, and Alzheimers. Unfortunately, TMS is typically applied in a one-size-fits-all manner without reference to one's biology.

Dr. Keller emphasizes an environment conducive to team-based learning in order to train the next generation of clinically-informed circuit neuroscientists, question the status quo with rigorous scientific experiments, and make important contributions in understanding how brain stimulation alters neural circuits and behavior and translate these findings to develop targeted, personalized, and more effective treatments.

Students in Dr Keller's lab will have the opportunity to contribute to ongoing investigations from funded research and work at the intersection of psychiatry, neuroscience, electrophysiology, brain stimulation, engineering, clinical trials, and precision neurotherapeutics. They will analyze already collected human multi-layered electrophysiological signals (high density scalp and intracranial EEG) paired with brain stimulation to better understand the relationship between 1) how brain circuits interact; 2) how treatments change these brain circuits; 3) how these changes map onto clinical symptoms. In addition, students will have the opportunity to contribute to our randomized clinical trial on personalized EEG-based closed-loop TMS treatment for depression. Dr. Keller will provide mentorship around analyzing brain signals, networking, grantsmanship, and manuscript writing.

We are looking for independent and motivated candidates with an interest in neuroscience / neurosurgery / neuropsychiatry, some experience coding (MATLAB, python), and strong communication skills.

The candidate will have the opportunity to collaborate with engineers, clinicians (neurologists, psychiatrists, neurosurgeons), and statisticians both within Stanford as well as outside institutions. The student will be located at the Stanford School of Medicine. We are open to consider remote work during this time, with the expectation that the candidate relocates to Stanford when possible.

Please email Corey Keller, MD, PhD (ckeller1@stanford.edu) with your CV and why you think you would be a good fit in the lab. We look forward to hearing from you!