

## **Identifying the Spatio-Temporal Trajectory of Cortical Processes**

Proposal Abstract for *Spatio-Temporal Bridging Technologies*

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Better understanding of the brain processes underlying normal and abnormal function is necessary for devising improved ways to diagnose and alleviate them. Over the past decades, brain imaging modalities --- functional magnetic resonance imaging (fMRI), electro- or magnetoencephalography (EEG/MEG), and single-neuron recording --- have begun to clarify the functional organization of the brain. It is now clear that even simple behaviors depend on the function of distributed brain regions, but previous techniques have not been able to accurately characterize how brain activity traverses the brain in space and time, e.g., from sensory cortex to motor cortex. In our P41 Center, we have been developing novel algorithmic techniques that make use of recordings from the cortical surface (electrocorticography (ECoG)) to chart the trajectory of task-related neuronal population activity across the human cortex in single trials. Thus, these novel techniques allow for unprecedented characterization of the brain processes that produce behavior, and for investigating the relationship of their properties with those of different behaviors.

Opportunities for collaborations with other P41 Centers lie in:

- o further refinement of algorithmic methods
- o application of those methods to important neuroscientific questions, both in humans as well as in animals