1128-92-345 **Guillaume Lajoie*** (glajoie@uw.edu). *Artificially-induced synaptic plasticity in motor cortex: a theoretical model of a bidirectional brain-computer interface.*

The field of online, closed-loop Brain-Computer-Interfaces (BBCI) is rapidly evolving, with applications ranging from a science-oriented tool to clinical treatments of motor injuries. However, with the enhanced capability of novel devices that can record and stimulate an ever-growing number of neural sites comes growing complexity. It is therefore crucial to develop a theoretical understanding of the effects of closed-loop artificial stimulation in the highly recurrent neural circuits found in cortex, and how such protocols affect functional cotex-to-muscle mappings across a range of timescales. In parallel with ongoing experiments, we developed a mathematical model of recurrent networks in cortex with probabilistic spiking mechanisms and spike-time-dependent plastic synapses (STDP) capable of capturing both neural and synaptic activity statistics relevant to BBCI protocols. This model successfully reproduces key experimental results and we use analytical derivations to predict optimal operational regimes for BBCIs. We make experimental predictions concerning the efficacy of spike-triggered stimulation in different regimes of cortical activity such as awake behaving states or sleep. (Received February 28, 2017)