Session/Poster# Presenter

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**Self-organized and self-sustained ensemble activity patterns in simulation of mouse primary motor cortex**

Cortical networks present different patterns of oscillations, synchronous activities, and various waves. The concept of self-organized signal processing in the cerebral cortex has become popular since Beggs and Plentz reported neuronal avalanches in local field potential recordings from organotypic cultures and acute slices of rat somatosensory cortex. The hypothesis behind this concept is that if neuronal avalanche activity followed inverse power law distributions, then brain activity may be set around phase transitions within self-organized signals. We explored self-organized signals in an isolated slice of our data-driven detailed mouse primary motor cortex model stimulation followed by power-law distributions in size and duration. In our simulation, a brief focal stimulation (100 ms; 0.57 nA/cell, 1.5% of the total 15 different cell type populations) in the M1 cortical model produced spontaneous population bursting activity for as long as the recording continued (10 min) step = 0.05ms) with different random wiring. Then we assessed clusters of spiking activity with distributions of avalanche activity. We placed all simulated spiking activity into 1-millisecond bins and defined an avalanche as adjacent bins filled with one or more action potentials, preceded and followed by at least one empty bin. We observed the mean time between the avalanches was 1.67ms. Interestingly, sometimes there was more than a 10ms time gap between avalanches. Most of the firing activity immediately before and after the avalanche came from IT5B/IT6 cortical cell type. We also observed four types of avalanches and the power law fits all four avalanches with an exponent of -1.52.