Title: Modeling anti-correlated slow oscillation activity from high quality ground truth dataset

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Summary (300 words max)

Spontaneous slow oscillations (0.01-0.1Hz) occur in the human brain during rest. Slow oscillations have been detected mainly in the cortex of all mammals, including rodents. However, the function and the mechanisms that drive slow oscillations remain unclear.
The evolutionarily conserved habenulo-interpeduncular nucleus pathway has emerged as a crucial circuit that mediates fear and stress-related behaviors. By carrying out volumetric functional imaging of thousands of habenular neurons during spontaneous activity in zebrafish larvae, preliminary data show slow oscillations that are anti-correlated between distinct neuronal populations. The first aim of this project is to collect ground truth dataset by simultaneously performing calcium imaging with electrophysiological recordings. The second aim is to train and apply a deep learning algorithm for spike inference with the dataset. The third aim is to use the inferred spike data to model the anti-correlated slow oscillation activity.