Phase-amplitude coupled oscillations and information flow in a multiscale model of M1 microcircuits

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Mouse 6-layer M1 with 10,171 neurons of 5 classes distributed in 15 populations
Full scale cylindric volume of 300 µm (diameter) x 1350 µm (cortical depth) with realistic cell densities and ratios

Model description

Combines connectivity data from several studies at multiple scales: long-range inputs, local microcircuit and dendritic synaptic distribution.

Oscillations

- Spontaneous firing rates distributions and spatial properties match cortical data.

Information flow

- Strongest information flow consistent with connectivity e.g. IT2/3 -> IT5A and upper PT5B
- Peak information flow frequencies match peak oscillation frequency of target populations
- Reveals subnetworks involving interneurons, e.g. strong influence from L2 SOM -> IT5A and upper PT5B

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