The RE cells were also modeled as a single compartment neuron:

$$\frac{dV_D}{dt} = -I^{K-leak} - I^{leak} - I^{Na} - I^{K} - I^{LCa} - I^{h} - I^{syn}. \tag{C.4}$$

The conductances for leak currents were I^{leak}: 0.05 mS/cm^2 and I^{K-leak}: 0.016 mS/cm^2. The maximal conductances for other currents were fast Na^+ (I^{Na}) current: 100 mS/cm^2; fast K^+ (I^K) current: 10 mS/cm^2; and low-threshold Ca^{2+}(I^{LCa}) current: 2.2 mS/cm^2.

C.2 Synaptic Currents. GABA-A, NMDA and AMPA synaptic currents were described by first-order activation schemes (Timofeev, Grenier, Bazhenov, Sejnowski, & Steriade, 2000). The equations for all synaptic currents used in this model are given in our previous publications (Bazhenov et al., 2002; Chen et al., 2012). We mention only the relevant equations:

$$\begin{aligned} I_{syn}^{AMPA} &= g_{syn}[O](V - E_{AMPA}),\\ I_{syn}^{NMDA} &= g_{syn}[O](V - E_{NMDA}),\\ I_{syn}^{GABA} &= g_{syn}[O](V - E_{GABA}). \end{aligned} \tag{C.5}$$

Appendix D: Supplementary Figures

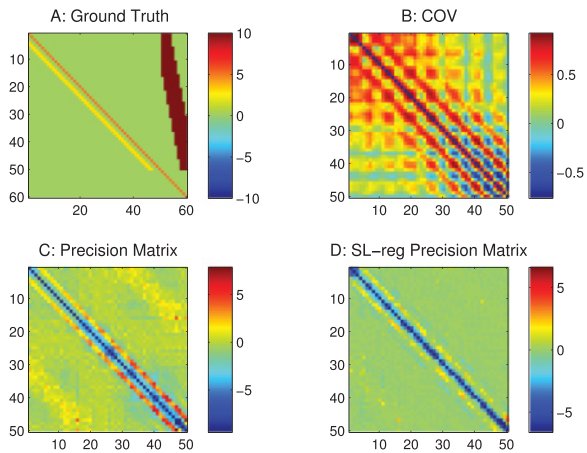

Figure 17: Passive neuron model with 5 ms fixed synaptic delay. Results from correlation-based methods. (A) Ground-truth connection matrix. Neurons 1–50 are visible neurons. Neurons 51–60 are invisible neurons. (B) Estimation from the correlation method. (C) Estimation from the precision matrix. (D) Sparse + latent regularized precision matrix.

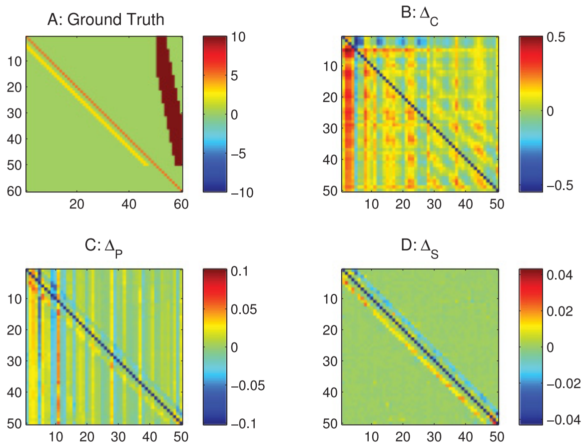

Figure 18: Differential covariance analysis of the passive neuron model with 5 ms fixed synaptic delay. The color in panels B, C, and D indicates the direction of the connections. For element A_{ij}, a warm color indicates i is the sink and j is the source: $i \leftarrow j$. A cool color indicates j is the sink and i is the source: $i \rightarrow j$. (A) Ground-truth connection matrix. (B) Estimation from the differential covariance method. (C) Estimation from the partial differential covariance method. (D) Estimation from the sparse + latent regularized partial differential covariance method.

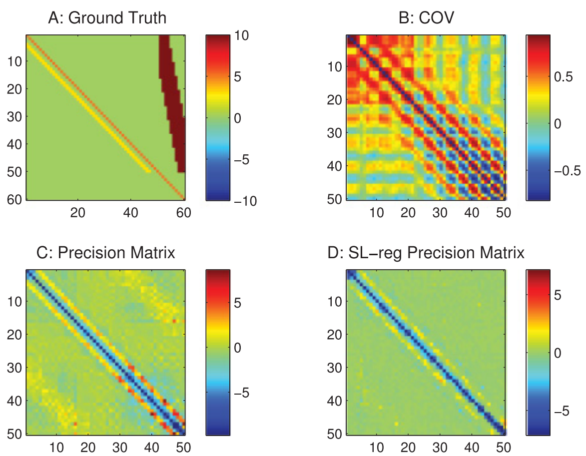

Figure 19: Passive neuron model with 0–10 ms uniformly distributed synaptic delay. Results from correlation-based methods. (A) Ground-truth connection matrix. Neurons 1–50 are visible neurons. Neurons 51–60 are invisible neurons. (B) Estimation from the correlation method. (C) Estimation from the precision matrix. (D) Sparse + latent regularized precision matrix.

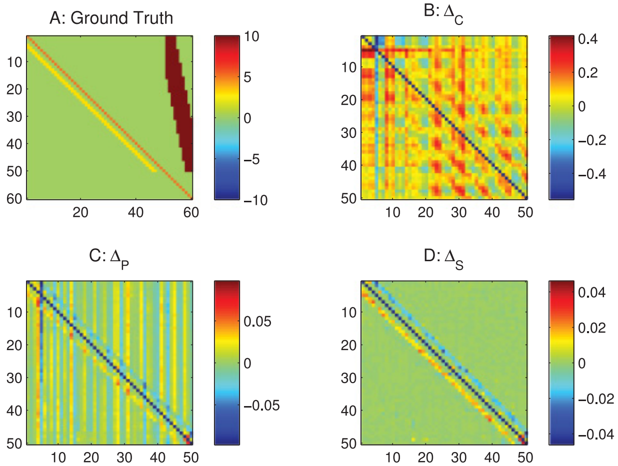

Figure 20: Differential covariance analysis of the passive neuron model with 0–10 ms uniformly distributed synaptic delay. The color in panels B, C, and D indicates the direction of the connections. For element A_{ij}, a warm color indicates i is the sink and j is the source: $i \leftarrow j$. A cool color indicates j is the sink and i is the source: $i \rightarrow j$. (A) Ground-truth connection matrix. (B) Estimation from the differential covariance method. (C) Estimation from the partial differential covariance method. (D) Estimation from the sparse + latent regularized partial differential covariance method.

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