

A Model summary	
Populations	One, excitatory-inhibitory hybrid neurons
Topology	—
Connectivity	Erdős-Rényi random graph
Neuron model	Leaky integrate-and-fire, fixed voltage threshold, no absolute refractory time
Channel models	—
Synapse model	δ -current inputs (discontinuous voltage jumps), additive or supra-additive input summation
Plasticity	—
Input	Constant external input current to each neuron
Measurements	Spiking activity, membrane potentials

B Population	
Elements	LIF neurons
Size	N

C Connectivity	
Type	Sparse, random recurrent, connections randomly chosen to be present with probability p_0
Weights	Randomly chosen to be ε_{Ex} with probability p_{Ex} , ε_{In} otherwise
Delay	τ , fixed, homogeneous

D Neuron and synapse model	
Name	LIF Neuron
Type	Leaky integrate-and-fire neurons, δ -current input
Subthreshold dynamics	$\dot{V}_l(t) = -\gamma_l V_l(t) + \sum_f \left[\sigma \left(\sum_{j \in M_{\text{Ex},l}(f)} \varepsilon_{lj} \right) + \sum_{j \in M_{\text{In},l}(f)} \varepsilon_{lj} \right] \delta(t - t^f - \tau) + I_{0,l}$
Spiking	If $V_l(t^-) + \varepsilon \geq \Theta_{U,l}$ set $t^* = t$, emit spike with time stamp t^* , reset $V_l(t) = V_{r,l}$
Dendritic interactions	Modulation of simultaneous excitatory inputs with dendritic modulation function σ

E Input	
Type	Constant external input current
Description	Constant external suprathreshold input current $I_{0,l}$ to each neuron l

F Measurements	
Spiking activity as raster plots, spike rates, synchronous pulses and chains of synchronous pulses, distributions of membrane potentials	