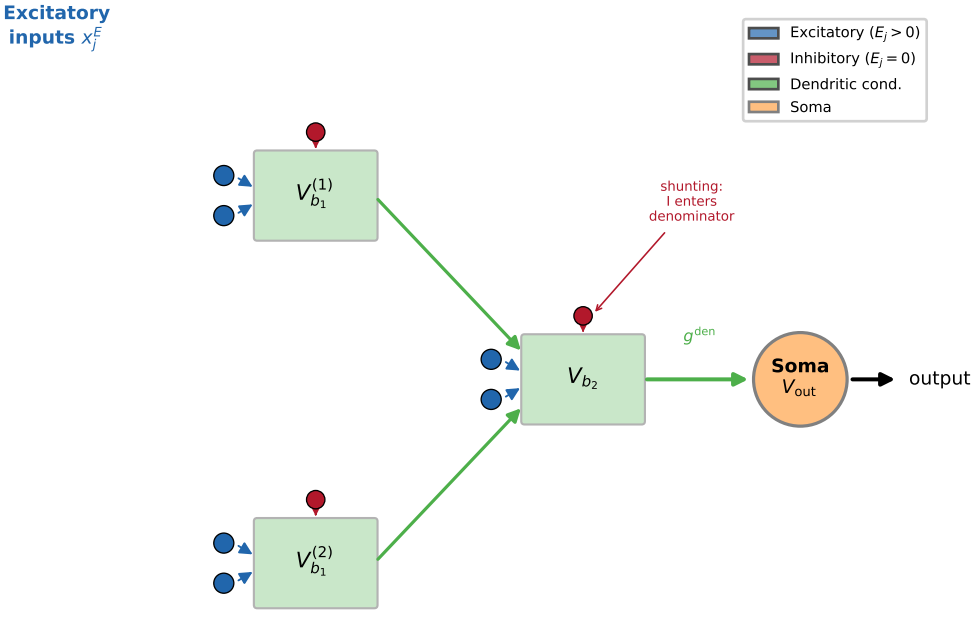
(A) Compartmental dendritic neuron



$$V_n = \frac{\sum_j E_j x_j g_j^{\text{syn}} + \sum_j V_j g_j^{\text{den}}}{\sum_j x_j g_j^{\text{syn}} + \sum_j g_j^{\text{den}} + 1}$$

(sums include both E and I synapses per branch)

(B) Local learning rule hierarchy

3F $\Delta g \propto x_j \cdot (E_j - V_n) \cdot \delta$

pre-synaptic × driving force × broadcast error

4F $\Delta g \propto x_j \cdot (E_j - V_n) \cdot \delta \cdot \rho$

+ variance / EMA modulator ρ

5F $\Delta g \propto x_j \cdot (E_j - V_n) \cdot \delta \cdot \rho \cdot \phi$

+ information-theoretic factor φ

Broadcast error δ: scalar / per-soma / local mismatch