An Introductory Course in Computational Neuroscience—Paul Miller (Notes)

Malcolm

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0.1 LIF

0.1.1 Formula

The *Nernst potential* E_A of an ion A of charge z_A with intracellular concentration $[A_{\text{in}}]$ and extracellular concentration $[A_{\text{out}}]$ is given by

$$E_A = \frac{k_B T}{z_A q_e} \ln\left(\frac{[A_{\text{out}}]}{[A_{\text{in}}]}\right)$$

The current through a channel is given by

$$I_t = G_t(V_m - E_t)$$

Where G_t represents conductance and E_t the nernst potential; t represents the type of channel. The total membrane current I_m can be modelled as