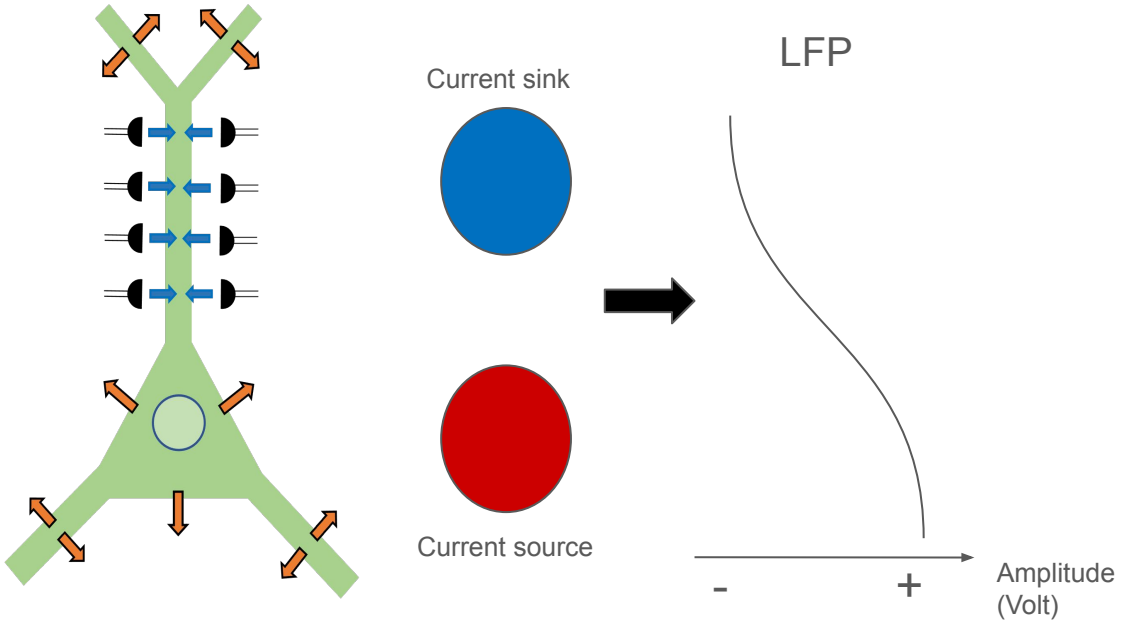
The Local Field Potential (LFP) and the Current Source Density (CSD)

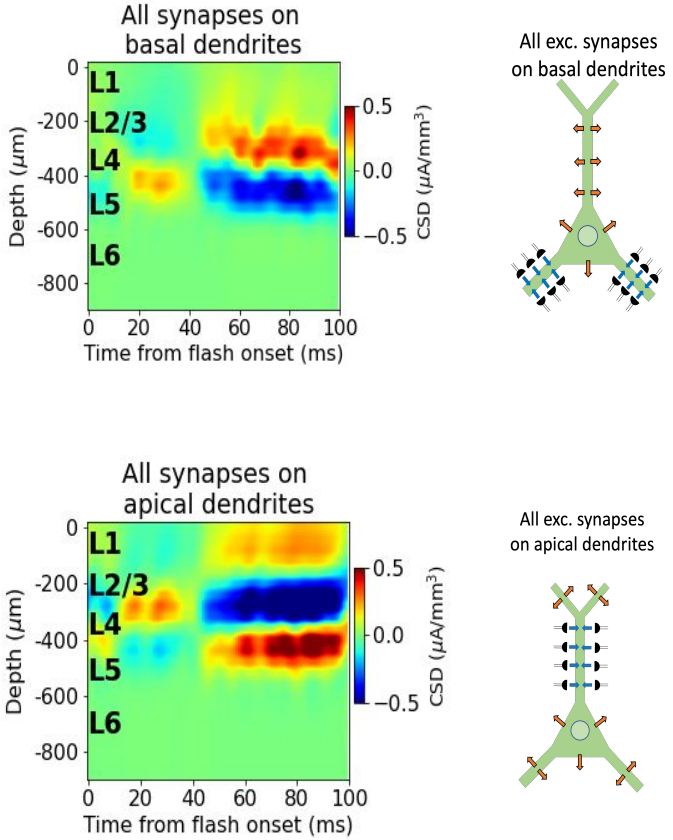
How is the LFP generated?



CSD plots tell you where ions enter or leave cells and can **provide information about input** to neural populations

- Current sinks (blue) tell you where positive ions enter the cells or negative ions leave the cells
- Current sources (red) tell you where positive ions leave the cells or negative ions enter the cells

CSD from simulation with L4 excitatory cells



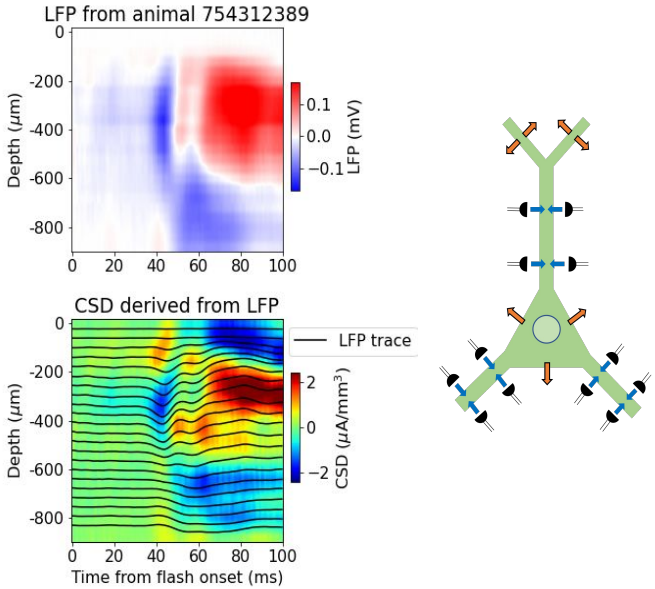
What are the local field potential (LFP) and current source density (CSD)?

- Local field potential (LFP) reflects transmembrane currents in populations near recording electrode
- Current source densities (CSD) is calculated from the LFP
  - More local measure of activity and easier to interpret

$$CSD = -\sigma \frac{\partial^2 \varphi}{\partial^2 z}$$

$\varphi: LFP$
$\sigma: Electrical\ conductivity$

Pettersen et al., 2006



CSD analysis can uncover shared neurophysiological signatures across animals