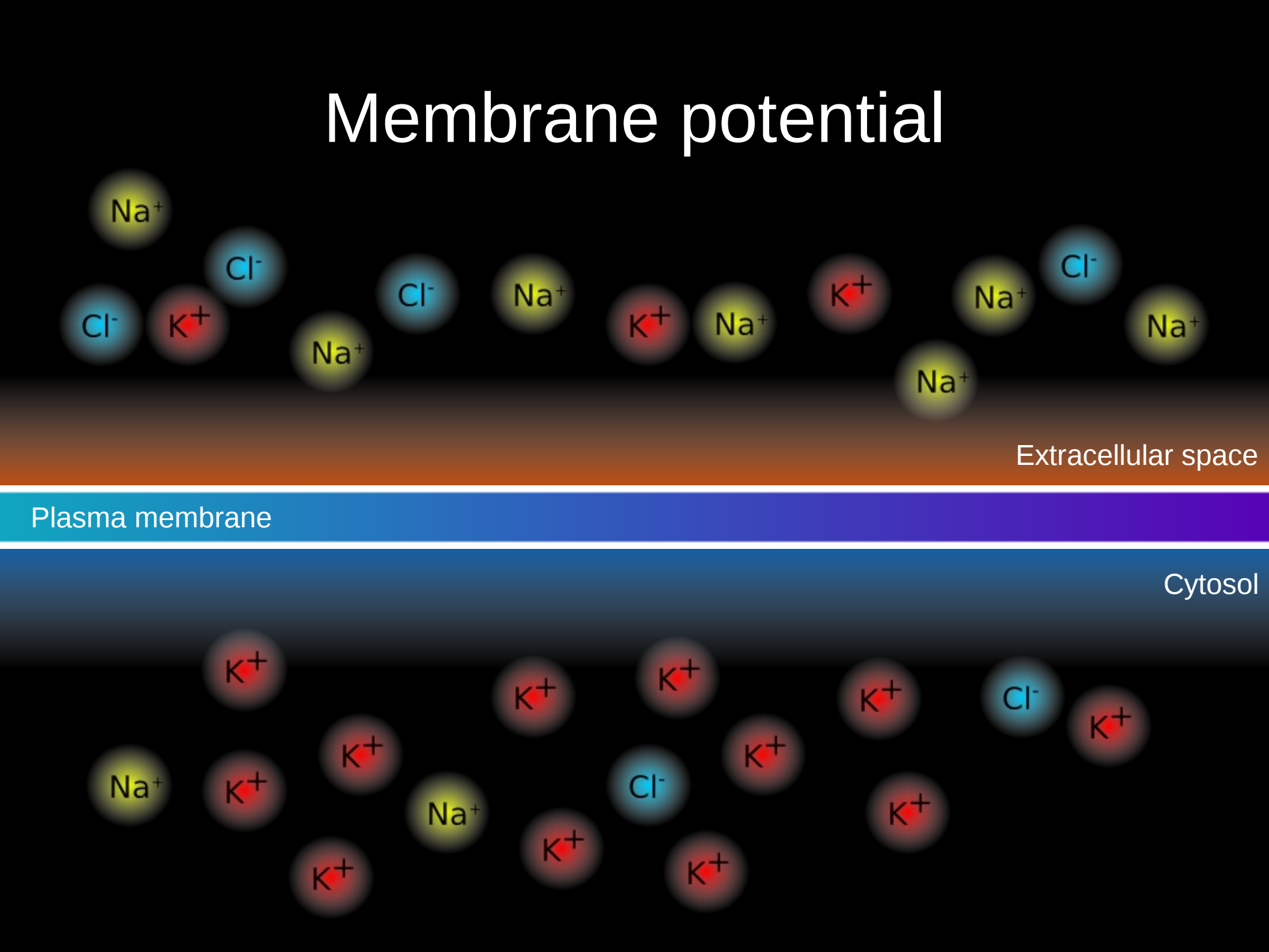
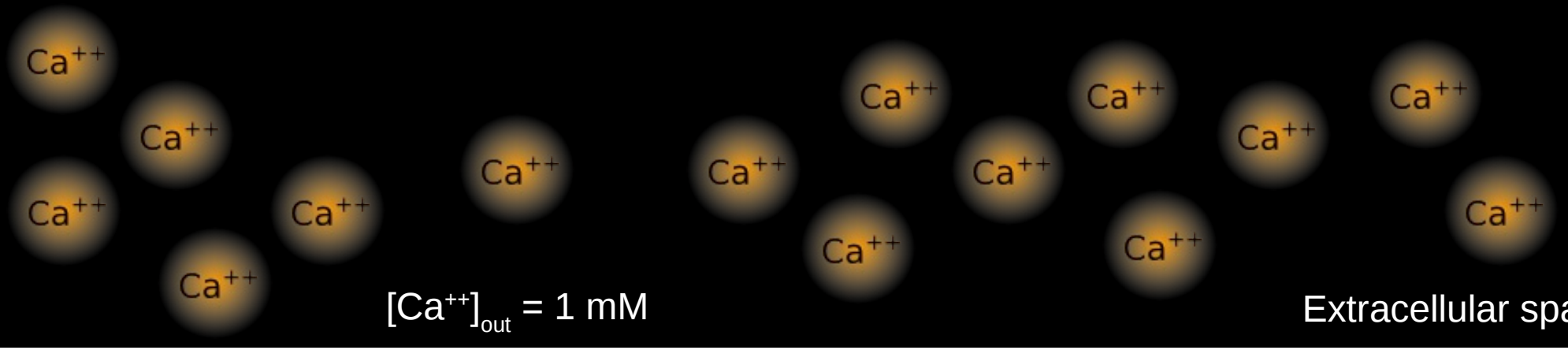
Calcium signalling

Membrane potential



Calcium concentration



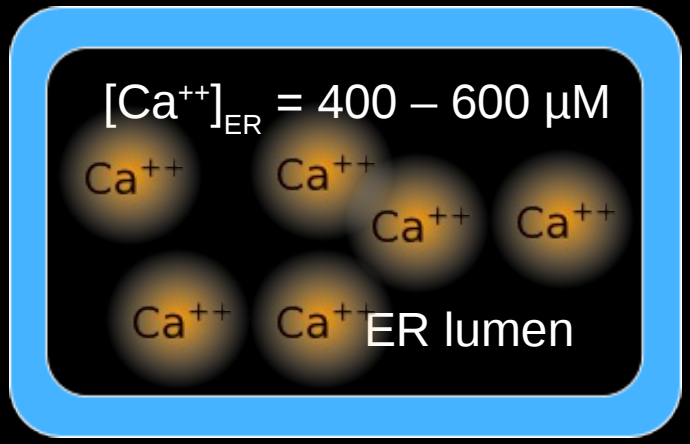
$[Ca^{++}]_{out}$ = 1 mM

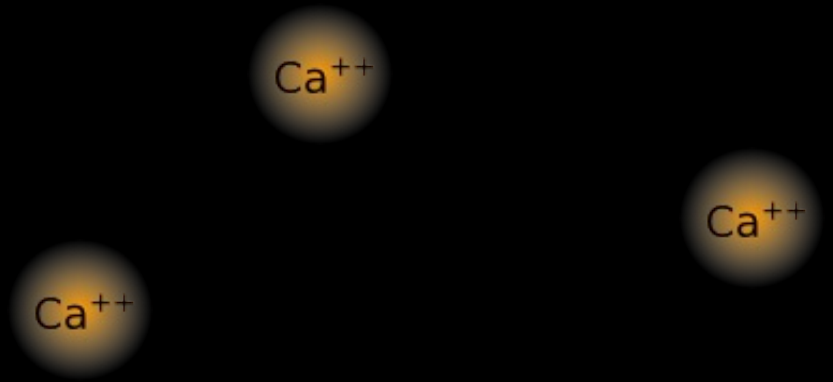
Extracellular space

Plasma membrane

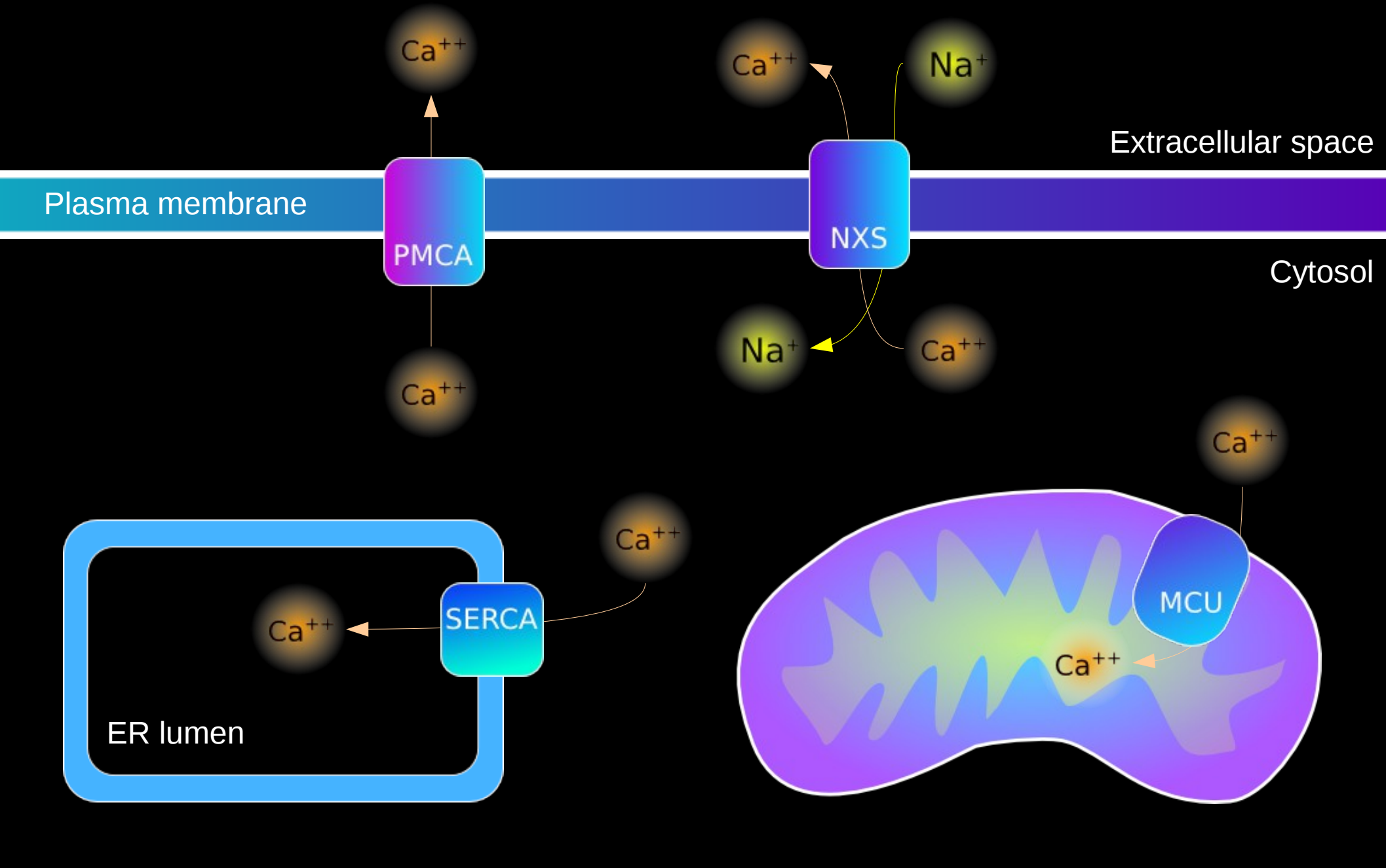
$[Ca^{++}]_{in}$ = 50 – 100 nM

Cytosol

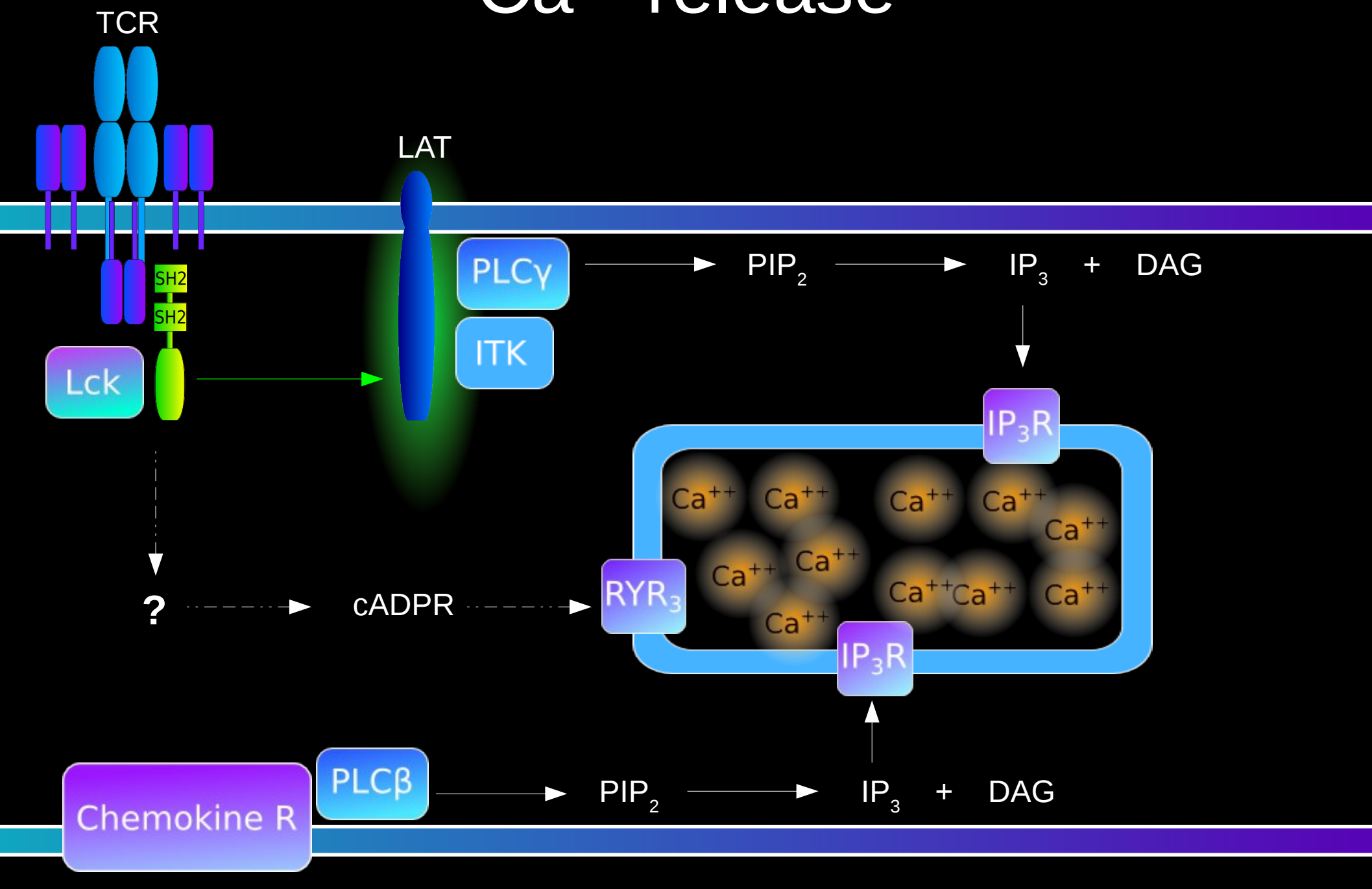




Maintenance of [Ca^{++}]

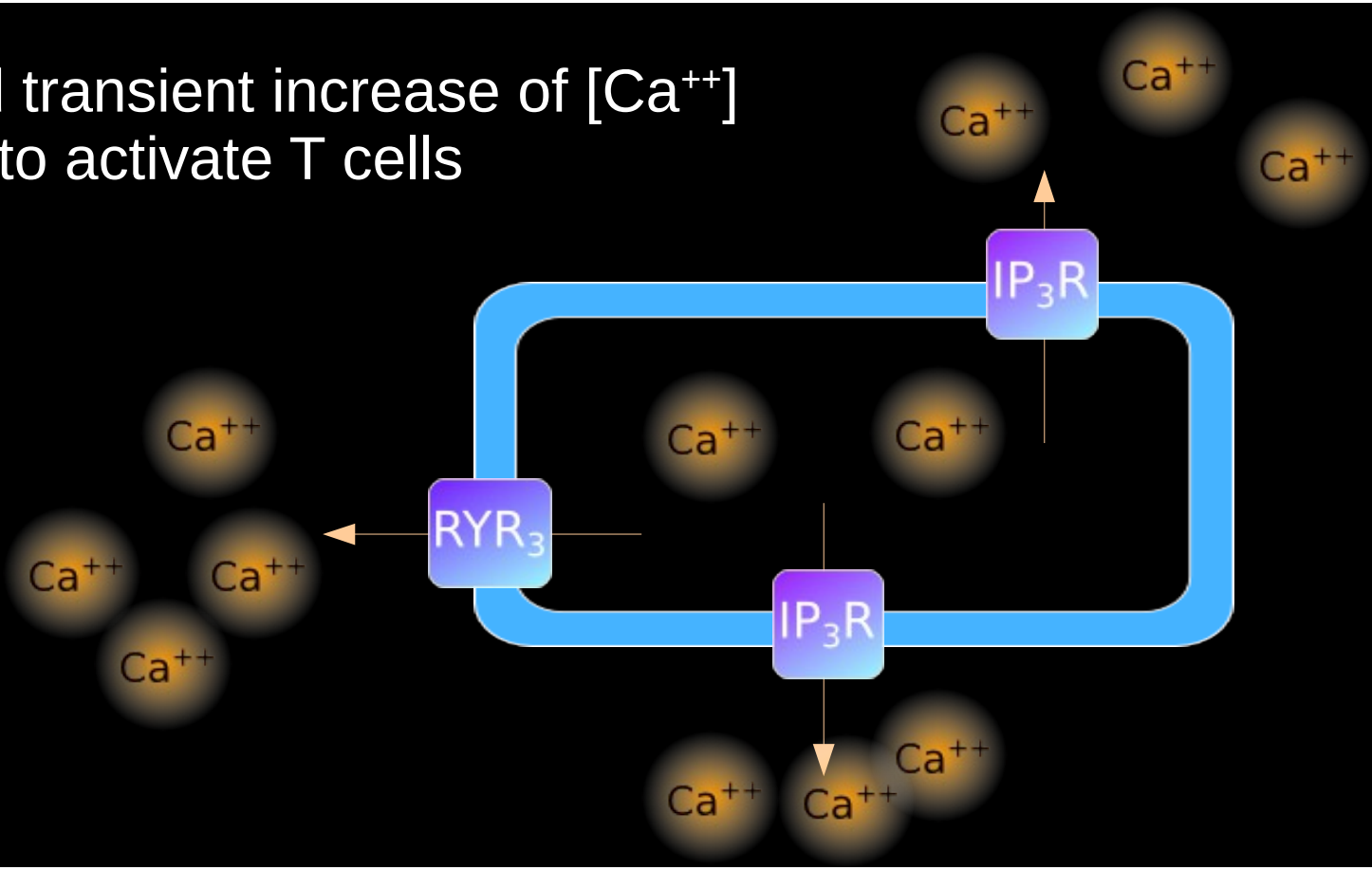


Ca^{++} release

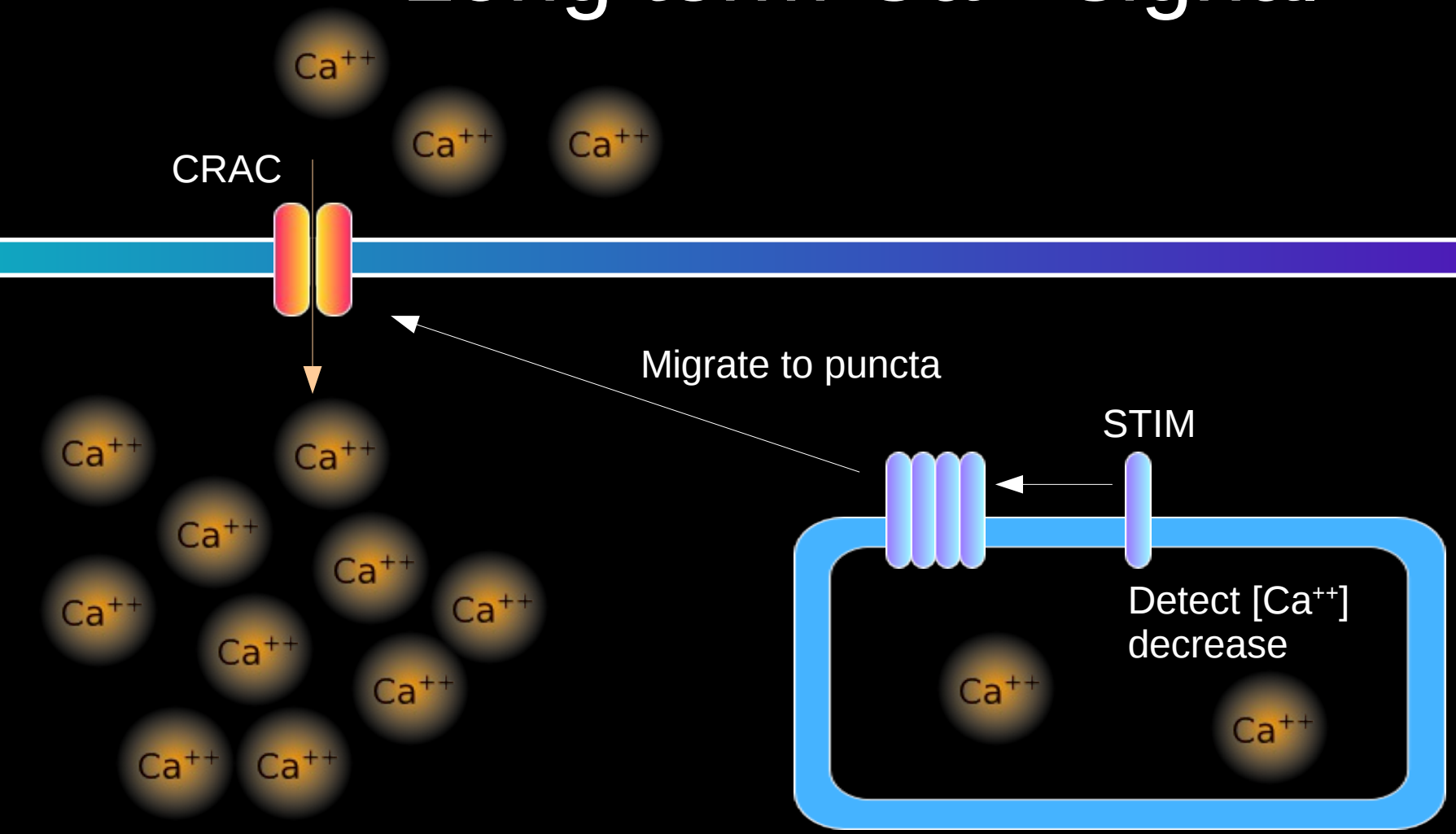

TCR
LAT
SH2
SH2
Lck
PLCγ
ITK
PIP2
IP3 + DAG
IP3R
Ca++
Ca++
Ca++
Ca++
Ca++
Ca++
Ca++
Ca++
Ca++
Ca++
Ca++
Ca++
RYR3
IP3R
?
cADPR
Chemokine R
PLCβ
PIP2
IP3 + DAG

Short term Ca^{++} signal

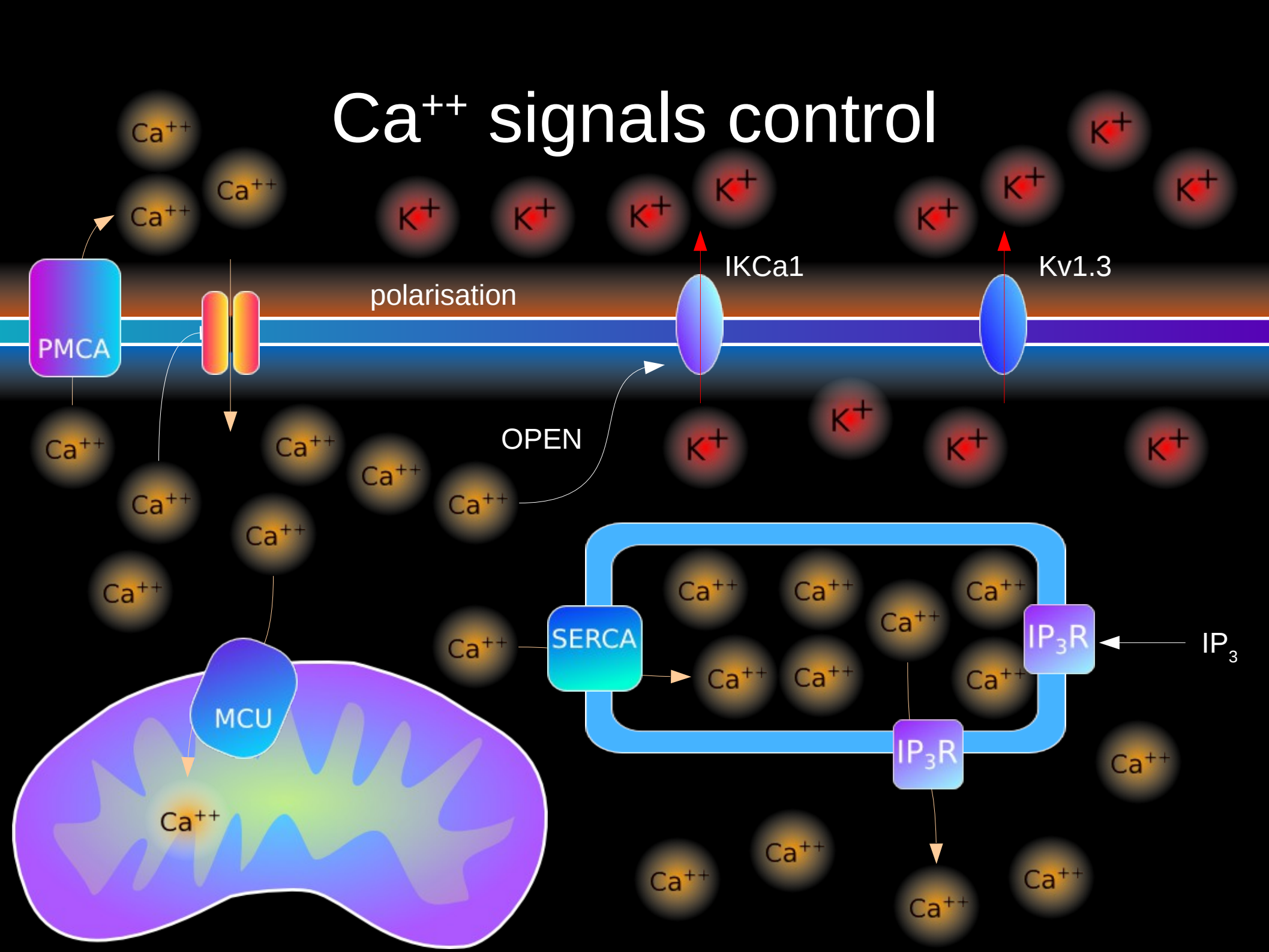
- Moderate and transient increase of [Ca^{++}]
- Not sufficient to activate T cells



Long term Ca^{++} signal



- Sustained increase of $[Ca^{++}]$
- Sufficient for gene expression


Ca++ signals control
Ca++
K+
PMCA
polarisation
IKCa1
Kv1.3
OPEN
SERCA
IP3R
IP3
MCU

Competition

- Actividy and localisation, relative to CRAC of:
  - Ca^{++} stores (ER, mitochnodria)
  - Ca^{++} ATPases (PMCA)
  - K^{+} channels (IKCa1 and Kv1.3)
  - Ca^{++} itself
- => A lot of possibilities to modulate $[Ca^{++}]_i$
- => Different types of Ca^{++} signals (oscillations)
- => Specificity