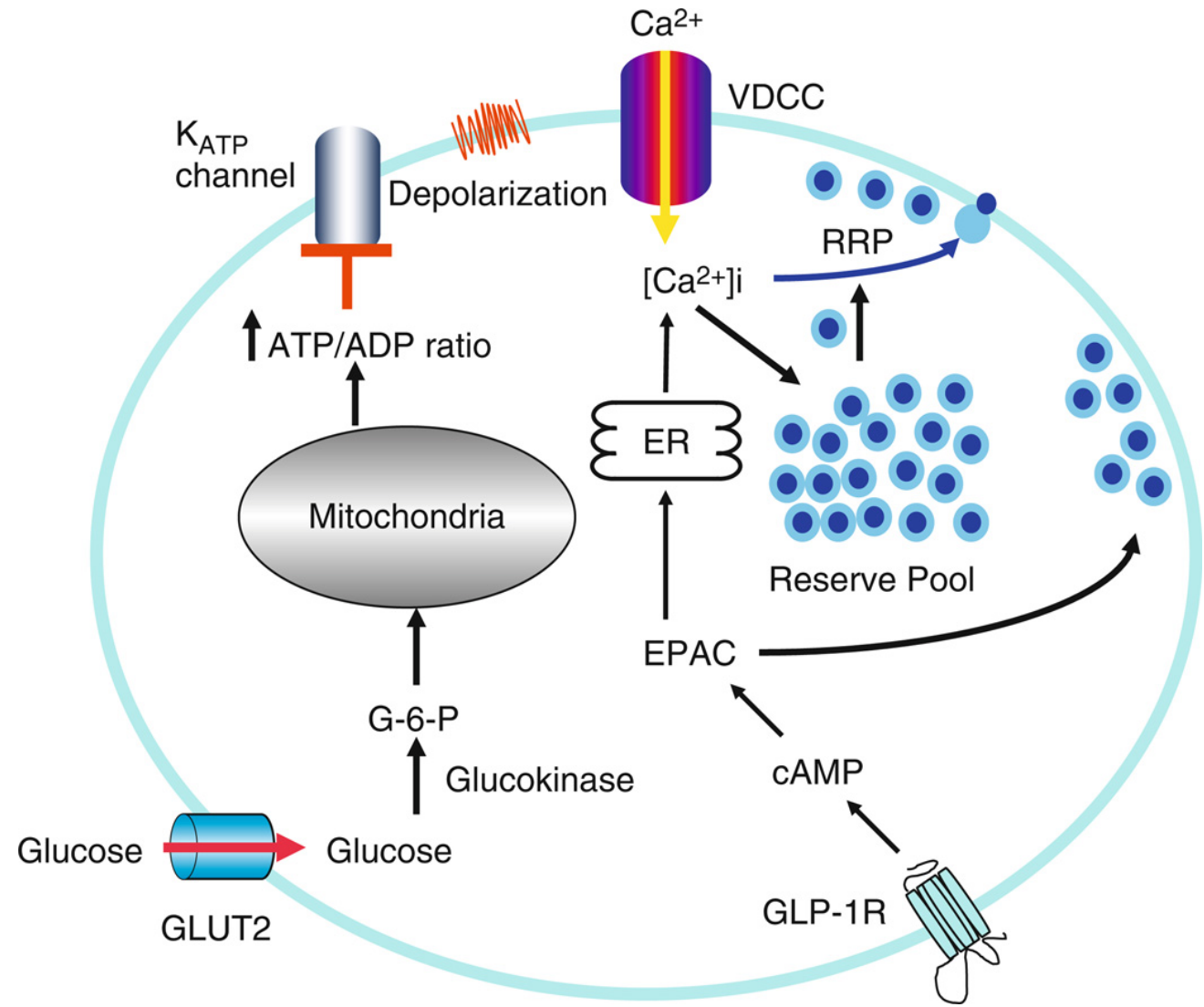


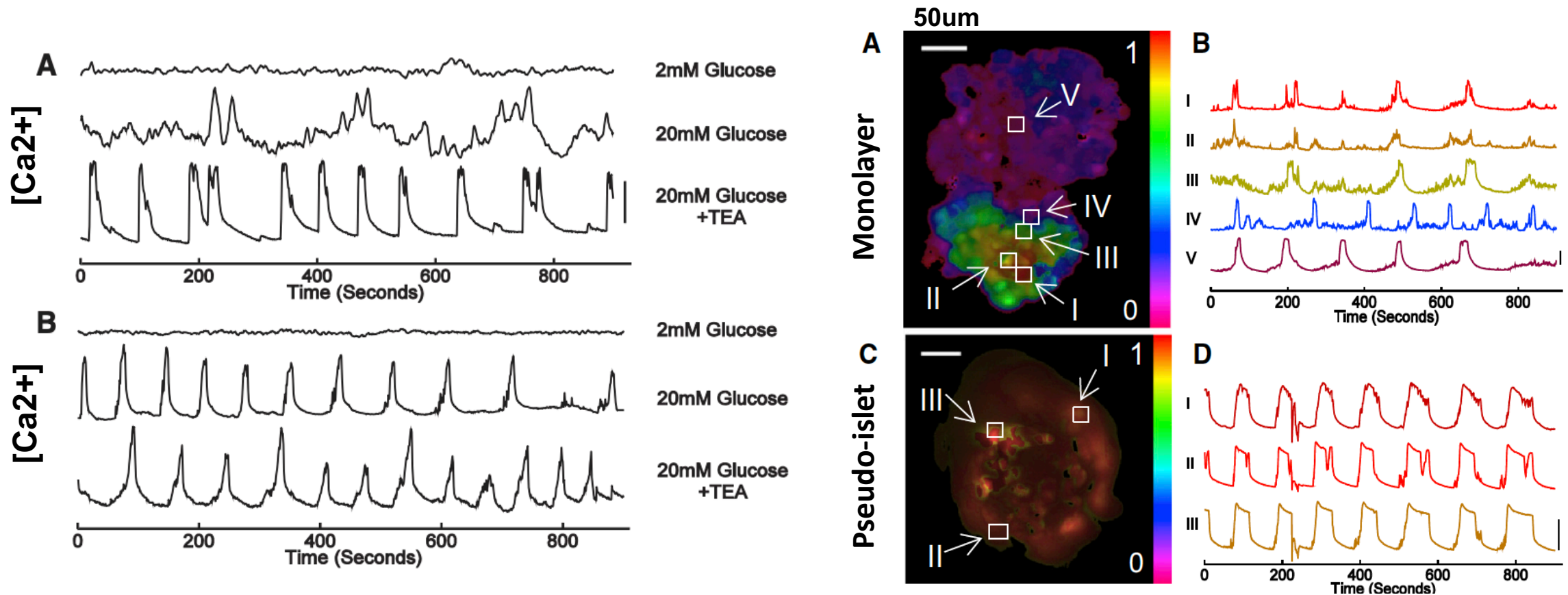
Intracellular Ca^{2+} is involved in Insulin Granule Exocytosis

- ATP-sensitive K^+ channels open and depolarize the cell in response to glucose metabolism
- Voltage-gated Ca^{2+} open and increase in $[\text{Ca}^{2+}]$ triggers insulin granule exocytosis
- Gap junctions allow communication of glucose stimuli to neighboring beta cells



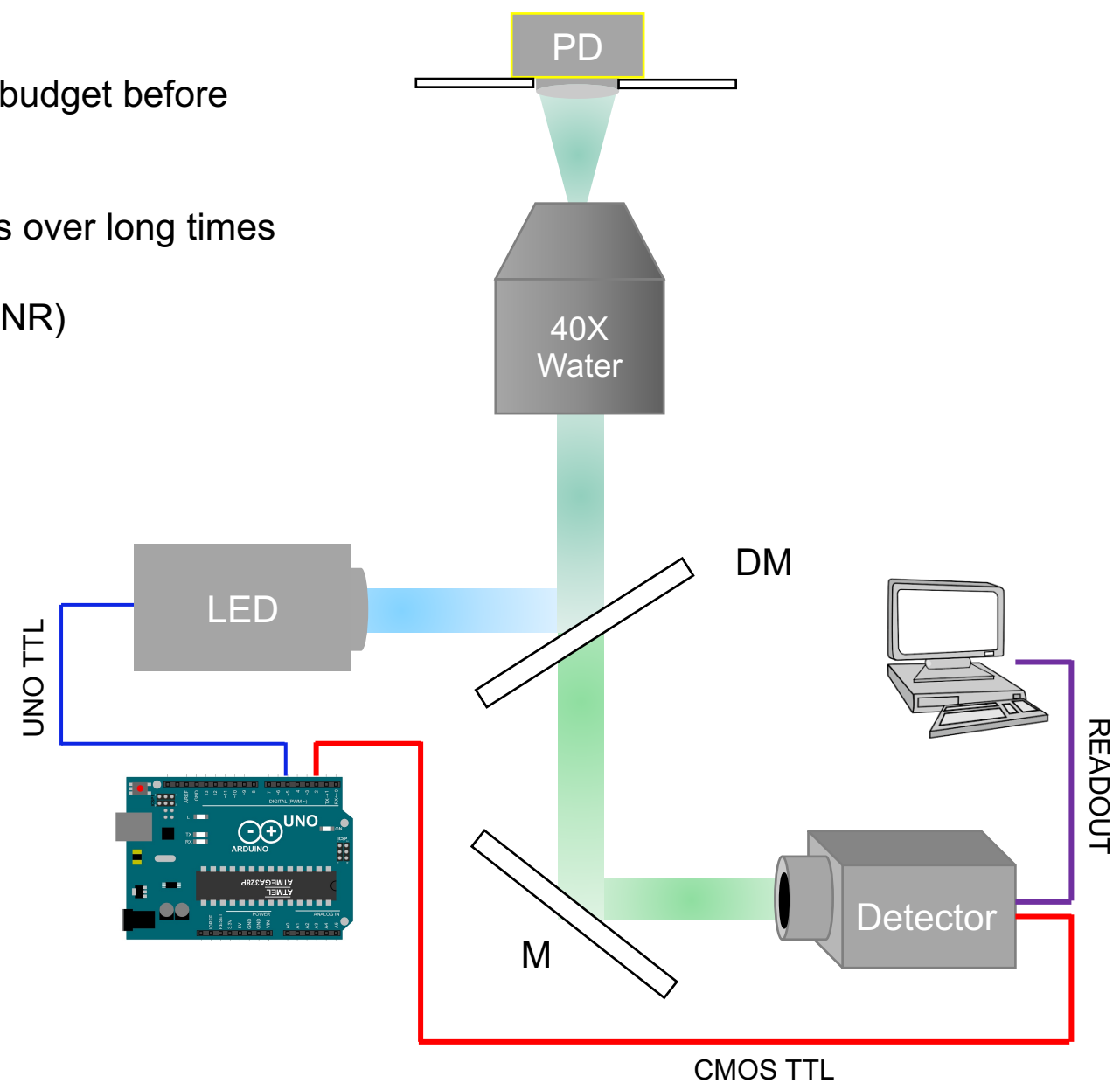
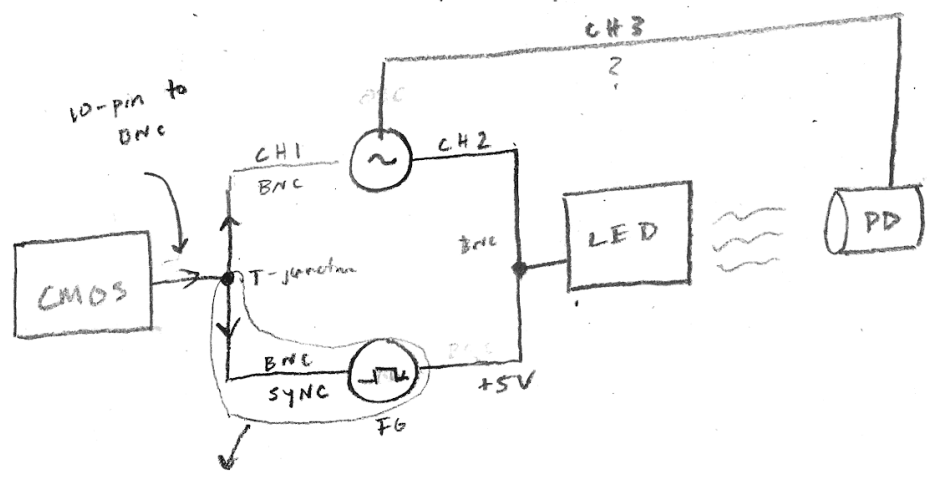
Synchronization of $[Ca^{2+}]$ oscillations is dependent on growth geometry

- Ca^{2+} oscillations appear to be more tightly controlled in pseudo-islets relative to monolayers
- MIN6 monolayers show reduced synchronization of $[Ca^{2+}]$ oscillations relative to pseudo-islets



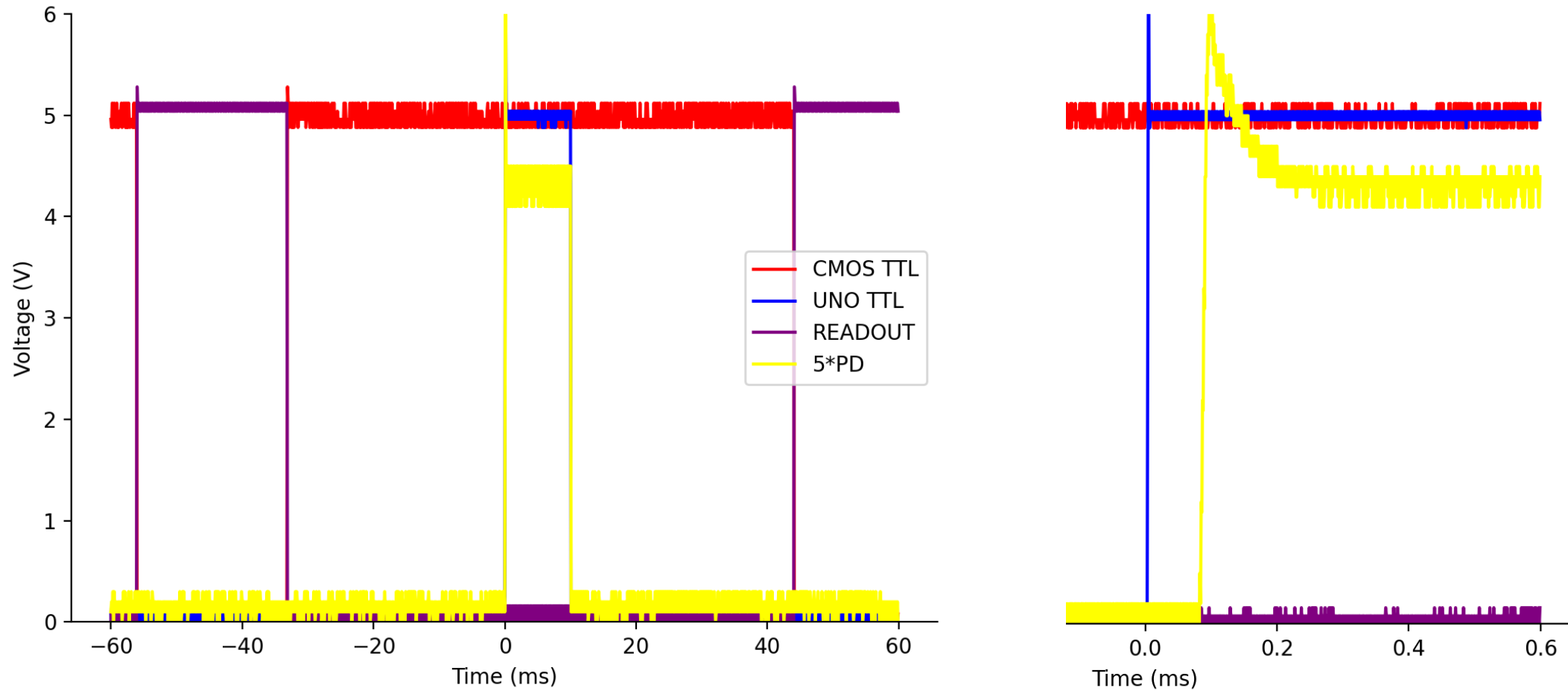
Photobleaching Imposes Constraints on Observable [Ca²⁺] Dynamics

- Fluorescent calcium indicators have a finite photon budget before photobleaching
- High frame rates over short times or low frame rates over long times
- High quantum efficiency and signal to noise ratio (SNR)



Transistor-Transistor Logic (TTL) Allows Precisely-Timed Pulsatile Excitation

- Brief excitatory pulses during sensor exposure limits photobleaching at low frame rates
- Global shuttering mechanism prevents collection bias over the CMOS sensor



Calcium Experiments