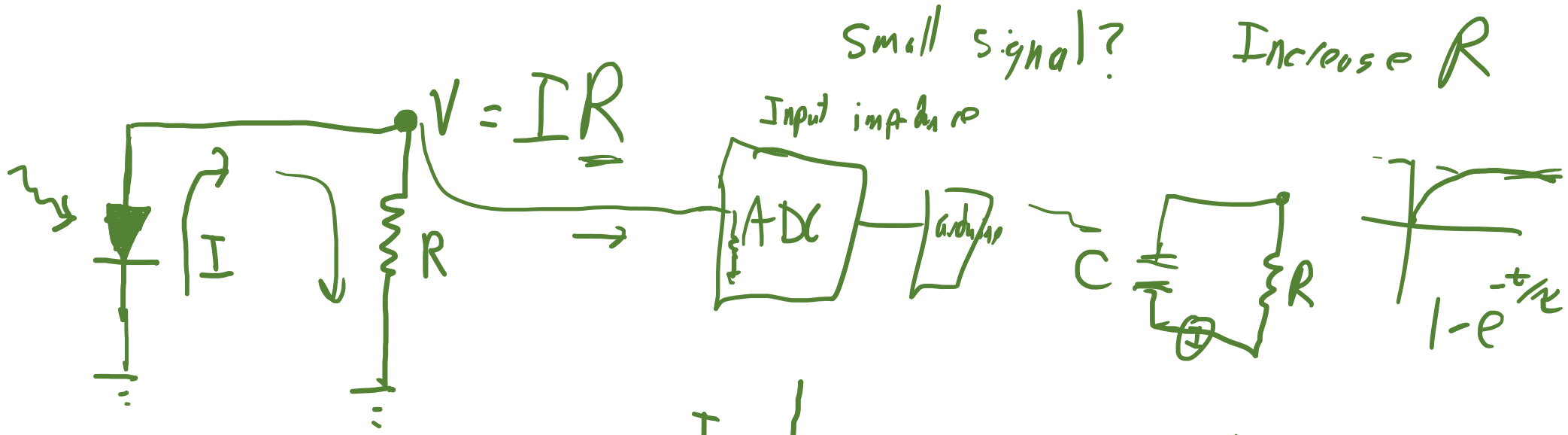
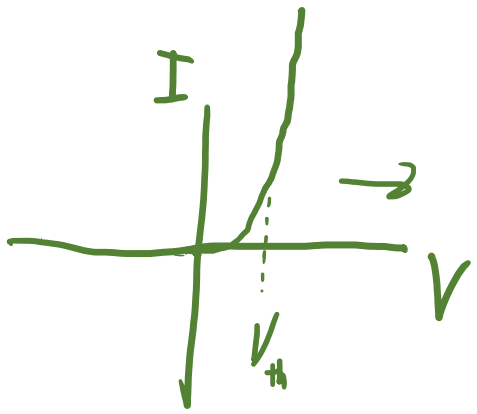
# Lab Meeting Dec 2, 2021

# Optical Power Meter

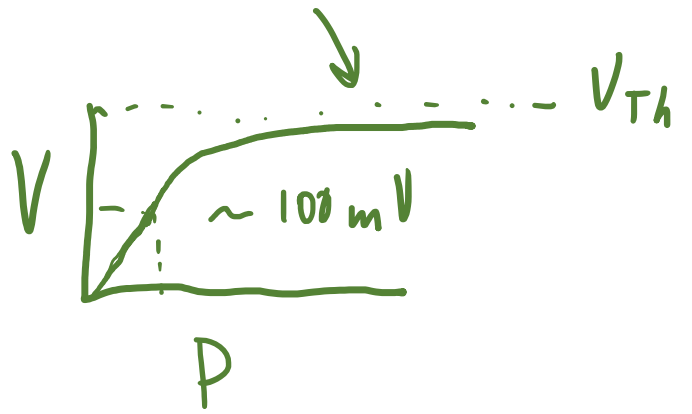
- Goal  - design parameters
  - Wavelength range: 405 nm – 800 nm
  - Power range: 0.1 mW up to 400 mW
  - Precision: 3 sig figs
    - Up to 400 mW with micro-watt precision…. 400,000 = 19 bits
    - 16 bits plus 10x attenuator
  - Hand held, battery powered, with display
  - Controller and wand
  - Home
  - USB interface???
  - Input for wavelength, calibrate
- Design (Electrical)
- Breadboard, calibrate, and test
- Revise
- Mechanical Design
- Tests



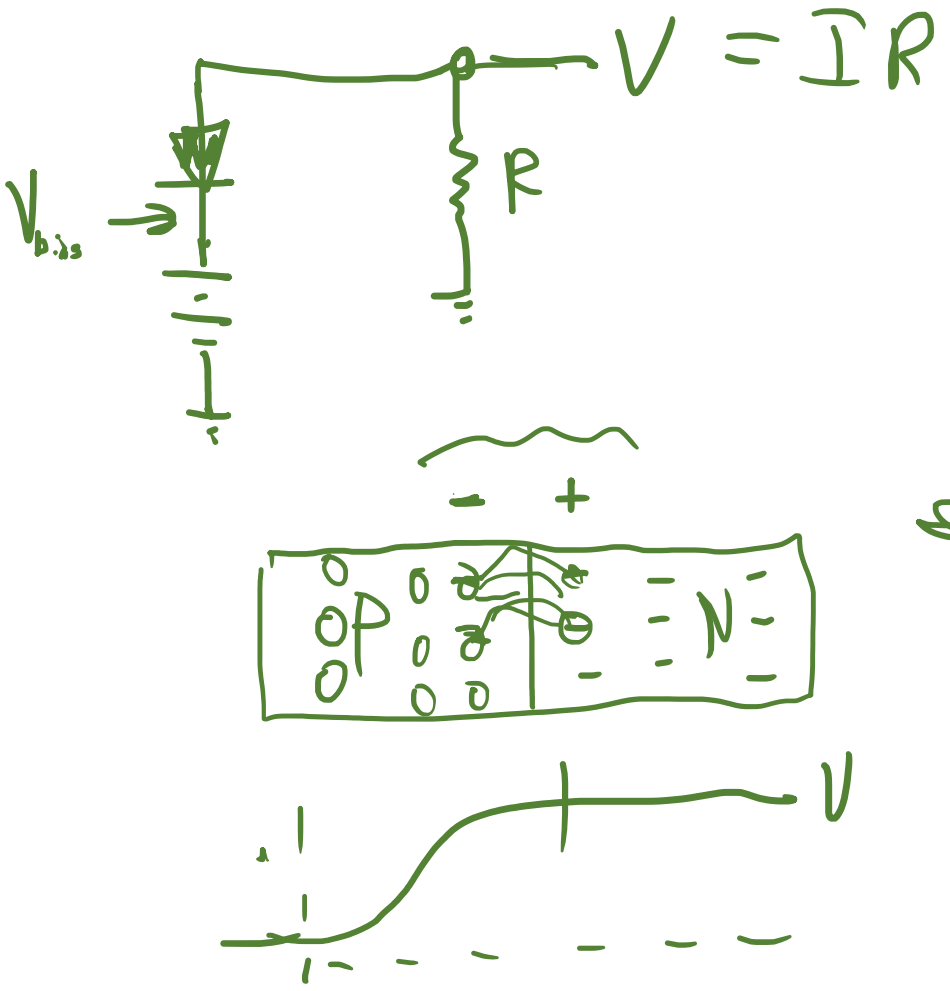




$\tau = RC$

Diodes
- Current only 1 way
- Have capacitance

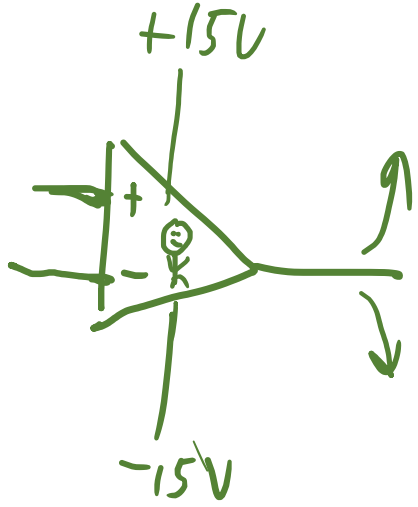


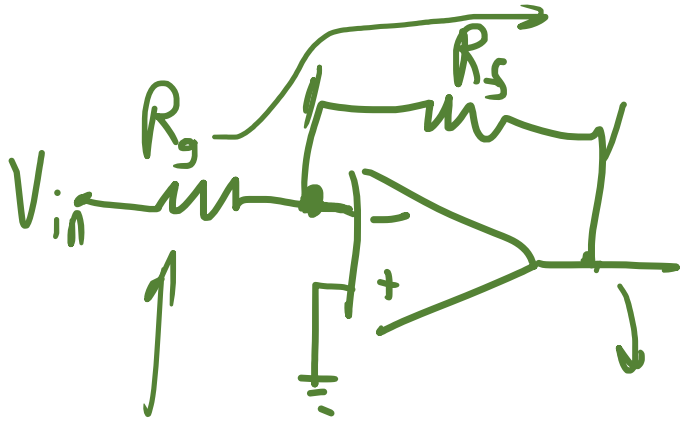

Photodiodes - generate a current




1. Reduces Prob w/ saturation
2. ~~Increases~~ noise
3. Reduces C

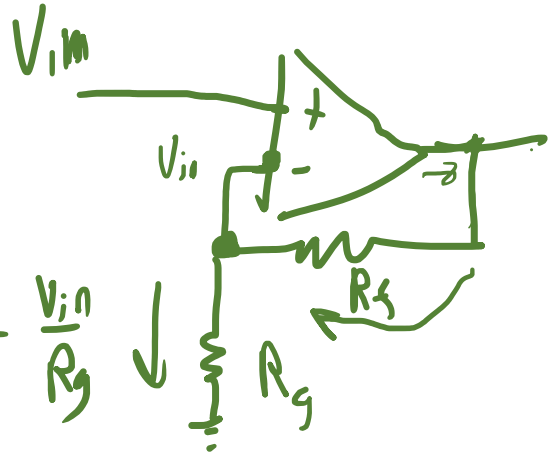
$$C = \varepsilon \frac{A}{d}$$




$$I = \frac{V_{in}}{R_g}$$

$$V_{out} = -I R_f = -V_{in} \frac{R_f}{R_g}$$




$$I = \frac{V_{in}}{R_g}$$

$$V_{out} = V_{in} + I R_f$$

$$= V_{in} + \frac{V_{in}}{R_g} R_f$$

$$= V_{in}\left(1 + \frac{R_f}{R_g}\right)$$