Disclaimer

These are notes for Prof. Spencer to give the lecture, they were not intended as a reference for students. Students asked for them anyway, so I’m putting them up as a courtesy. Remember that they are not intended as a substitute for attending lecture.
PN Junctions Have Capacitance

- Change in width results in more “space charge”

Optional: Should I fwd/rev Bias Photodiodes?

- You may find your light frequency to decide which ought to be
  \[ V = \frac{V_{IN} \cdot R_{L}}{R_{L} + (R_{IN} + R_{L})C_{S}} \]
  - Works rev. bias \( C_{S} \) smaller
  - For larger bias, less current
  - No current without bias, less current
BJTs Have Two PN Junctions + Base Current

- BE junction usually forward biased, BC usually reverse biased (small)
- Charge is in transit through the base all the time, need to supply more
  - Emitter charge goes to collector, so comes from base. Changing river level ...

Describe BJT Small Signal Speed Limit with $f_T$

How fast can we go?
- Often measured with $f_T$, frequency where $A_i$ drops to 1

$$V_{be} = rac{V_{be} + V_T}{1 + eta (C_T + C_m)}$$

$$A_T = \frac{\beta}{1 + \beta (C_T + C_m)}$$

$$f_T = \frac{1}{2\pi \frac{2m}{C_T}}$$