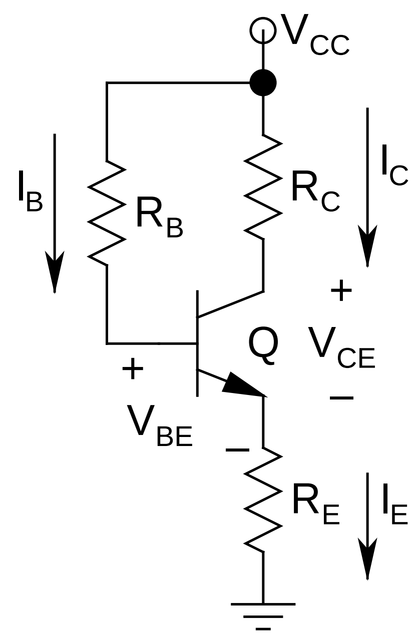
- ***Emitter Feedback Bias***:
  - ***While writing KVL, never take CE or BC loops, since V_{CE} and V_{BC} are not known***
  - ***Consider only BE loops with V_{BE} = 0.7 V***
  - $V_{CC} = I_B R_B + V_{BE} + I_E R_E$

$$\Rightarrow I_B = \frac{V_{CC} - V_{BE}}{R_B + (\beta + 1) R_E}$$

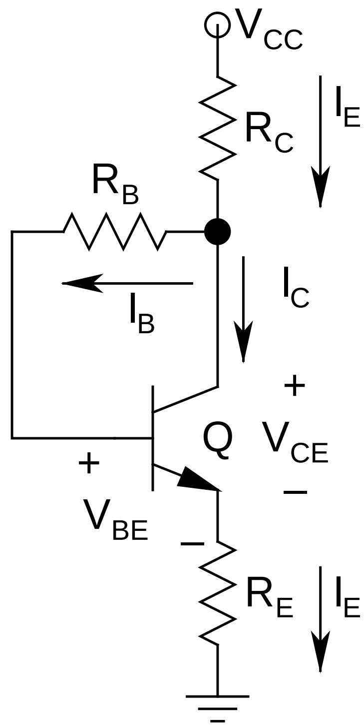


- $I_C = \beta I_B$
- $V_{CE} = V_{CC} - I_C R_C - I_E R_E \approx V_{CC} - I_C(R_C + R_E)$
- $P_D = V_{CC} \times I_E$
- This is a ***3-element output branch***, with ***$V_{CE} = V_{CC}/3$ for BB***
- ***Rest $2V_{CC}/3$ drops across R_C and R_E, with the ratio typically chosen to be 2:1*** (reason later!)
- Circuit is ***very robust*** since R_E provides ***negative feedback***
- Also, has ***better β insensitivity***

- ***Collector Feedback Bias*:**
  - $V_{CC} = I_E(R_C + R_E) + I_B R_B + V_{BE}$

    $$\Rightarrow I_B = \frac{V_{CC} - V_{BE}}{R_B + (\beta + 1)(R_C + R_E)}$$
  - $I_C = \beta I_B$
  - $V_{CE} = V_{CC} - I_E(R_C + R_E)$
  - $P_D = V_{CC} \times I_E$
  - This circuit also provides

    better β insensitivity



- ***Voltage Divider (or 4-Resistor) Bias***:
  - ***The best***: ***Extremely robust and versatile***
  - If properly designed, ***almost β independent***
  - If $I_1 \geq 10 I_B$, $I_1 \approx I_2$

$$\Rightarrow V_B \simeq \frac{R_2}{R_1 + R_2} V_{CC}$$

$$\Rightarrow V_E = V_B - V_{BE} \text{ and } I_C \simeq I_E = V_E / R_E$$