

FUNDAMENTALS OF NANO ELECTRONICS

Basic Concepts

The New Perspective

2. Energy Band Model

3. What and Where

is the Voltage?

4. Heat & Electricity:

Second Law & Information

1.1. Introduction

1.2. Two Key Concepts

1.3. Why Electrons Flow

1.4. Conductance Formula

1.5. Ballistic(B) Conductance

1.6. Diffusive(D) Conductance

1.7. Connecting B to D

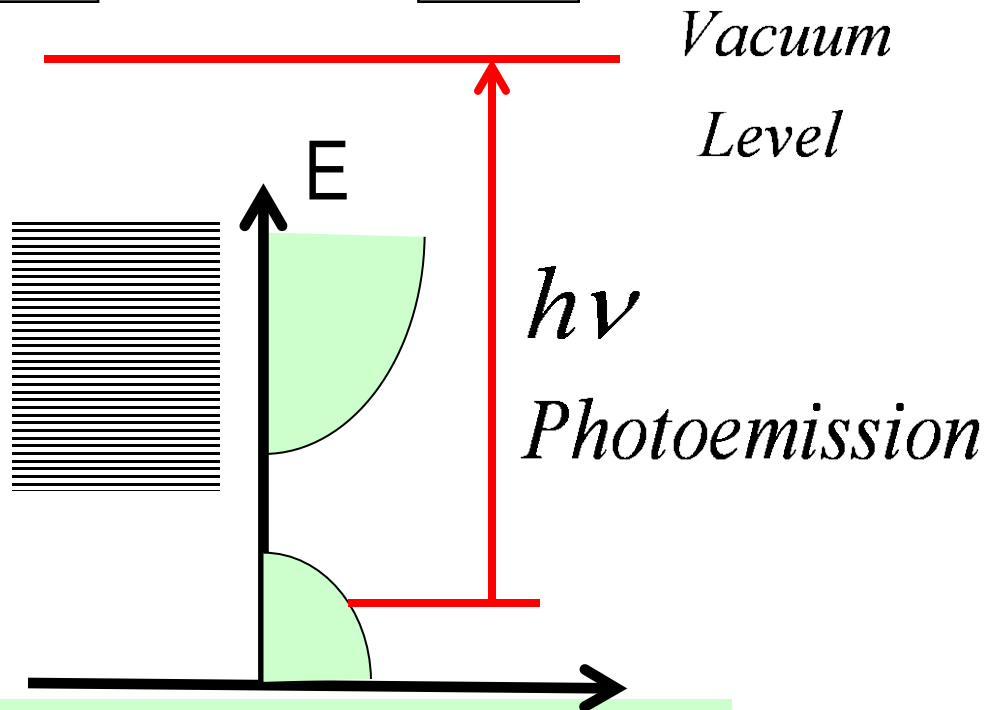
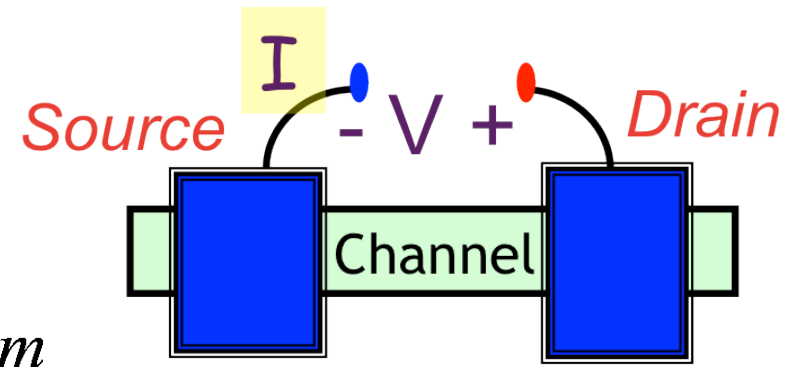
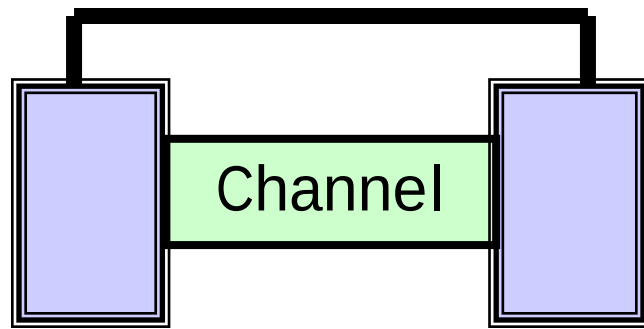
1.8. Angular Averaging

1.9. Drude Formula

1.10. Summing up ..

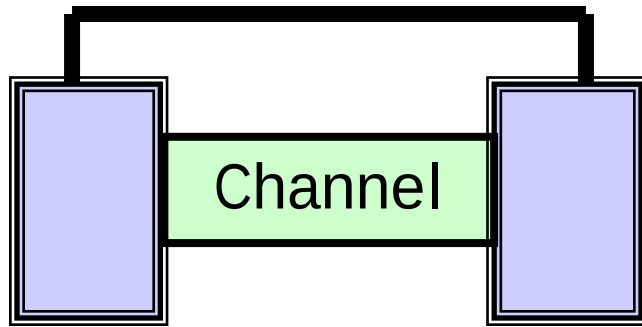
Equilibrium, $V=0$

1.2a Two key concepts



Equilibrium, $V=0$

1.2b Two key concepts



Fermi function

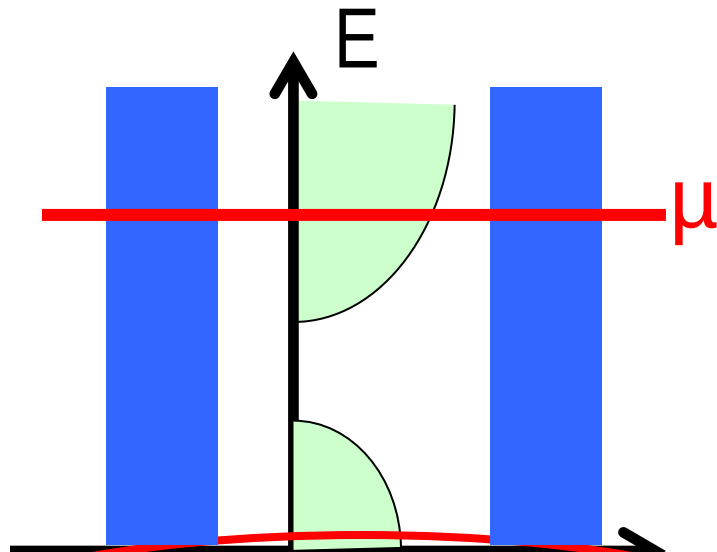
$$f(E) = \frac{1}{1 + e^{(E-\mu)/kT}}$$

$$kT \approx 25 \text{ meV}$$

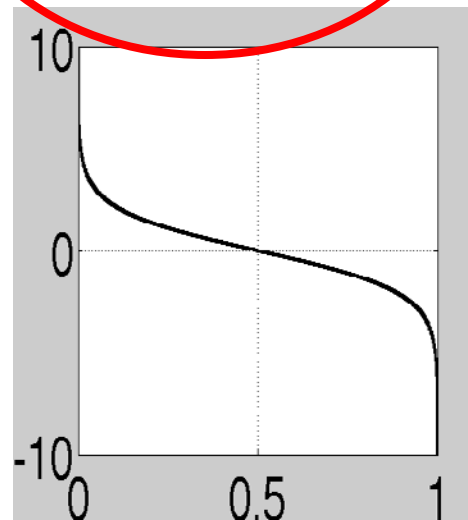
$$= 25 \times 10^{-3}$$

$$\times \underbrace{1 \text{ electron}} \times 1V$$

$$1.6 \times 10^{-19} \text{ coul.}$$



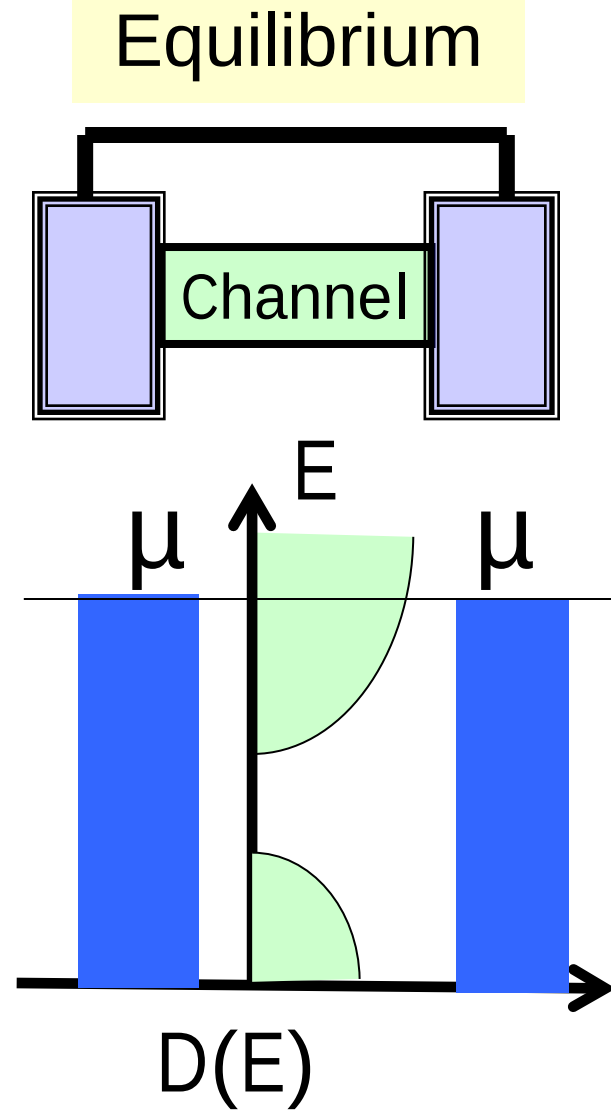
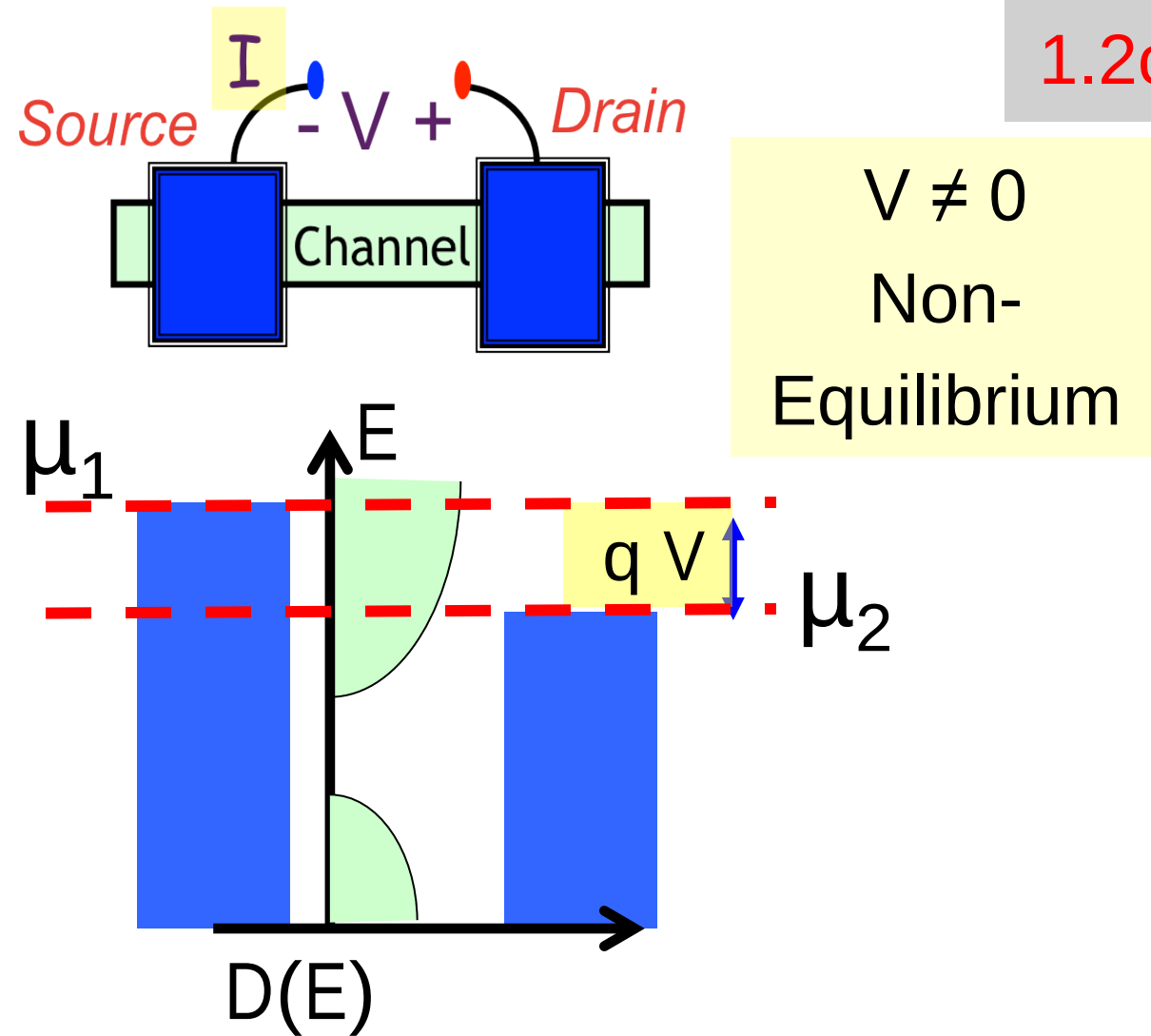
Density of States, $D(E)$



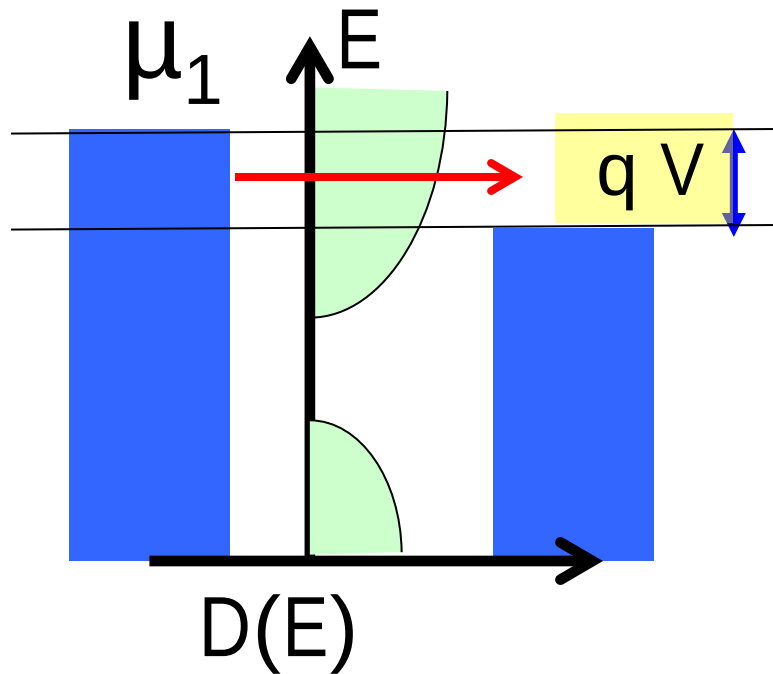
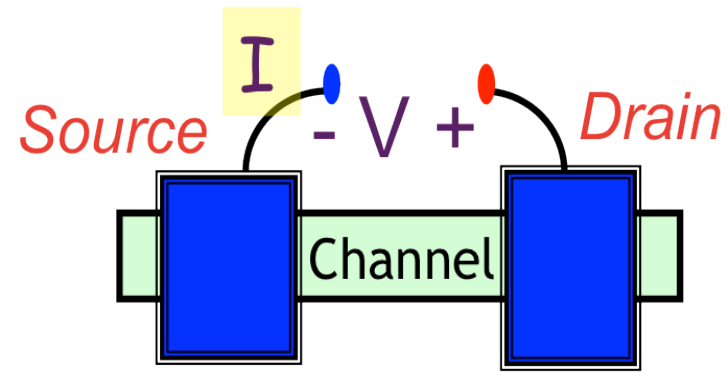
$f(E) \rightarrow$

$$\uparrow \frac{E - \mu}{kT}$$

1.2c Two Key Concepts



Coming up next ..



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