

Hypothèses du modèle de Drude (1900)

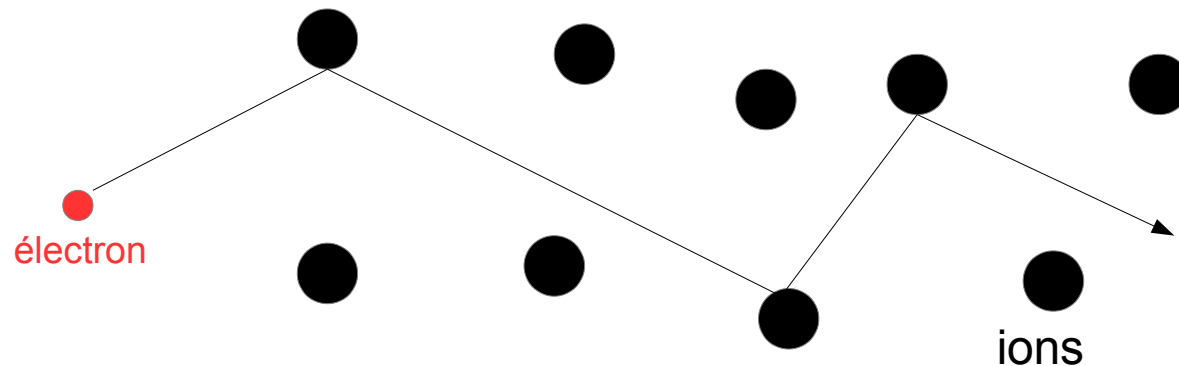
Le gaz classique d'électrons libres

Approximation des électrons indépendants : les électrons n'interagissent pas entre eux

Approximation des électrons libres : les électrons n'interagissent pas avec les ions

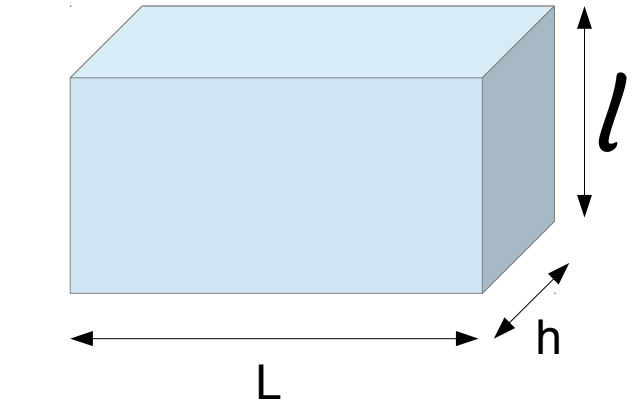
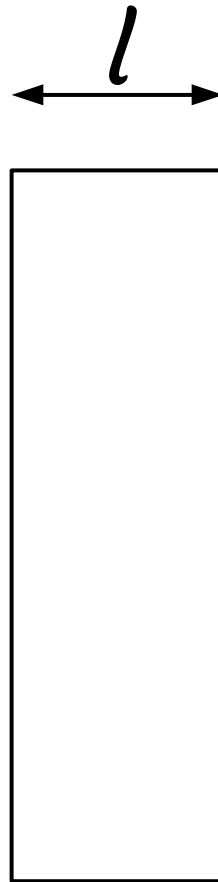
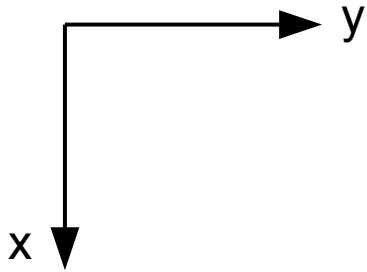
Collisions ponctuelles électron-ion à l'origine de la résistivité du métal

Équilibre thermique local du gaz d'électrons



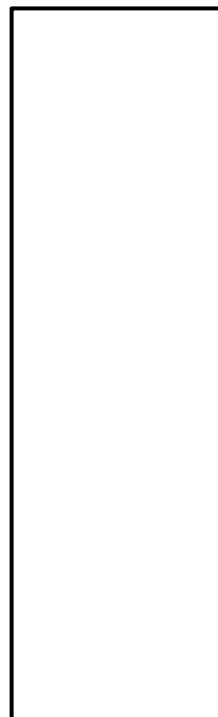
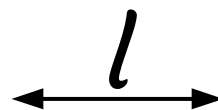
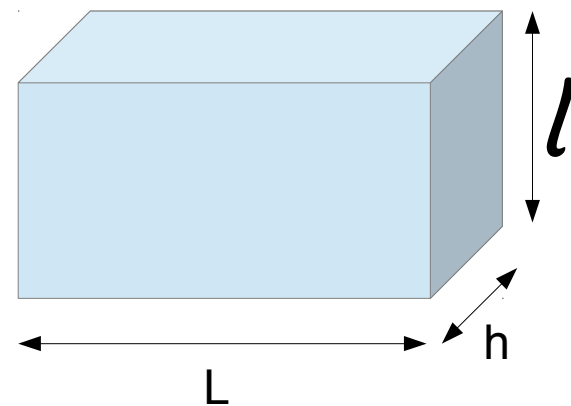
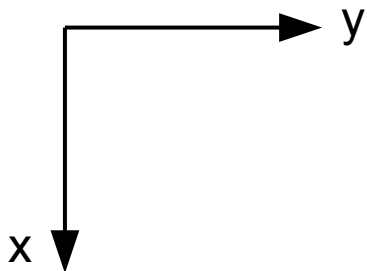
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Principe ($q < 0$)



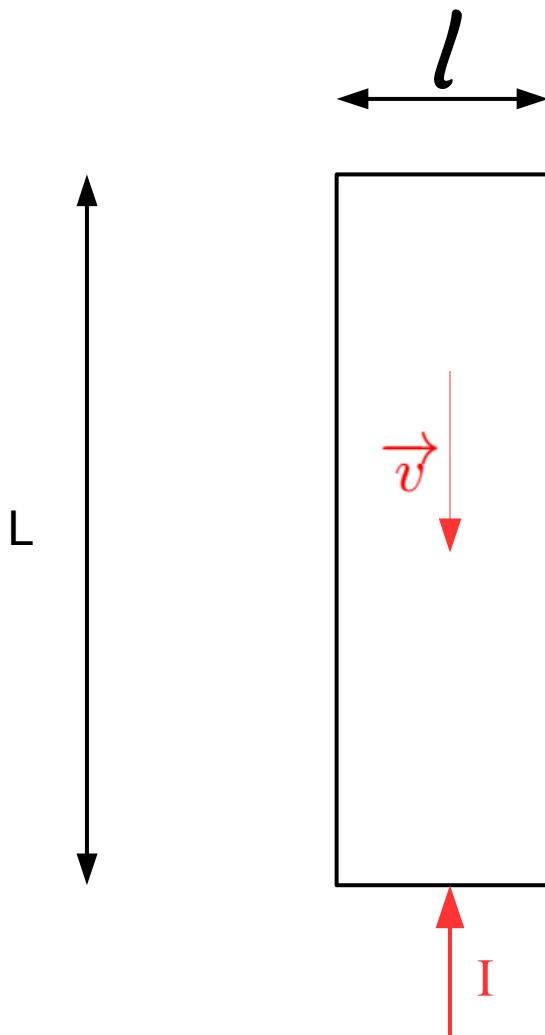
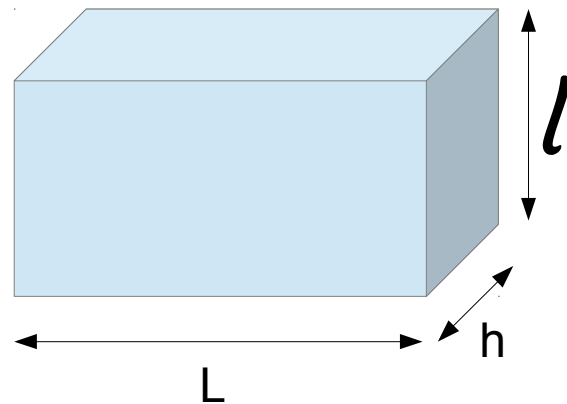
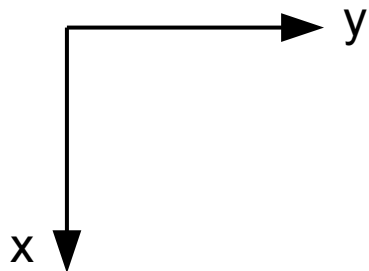
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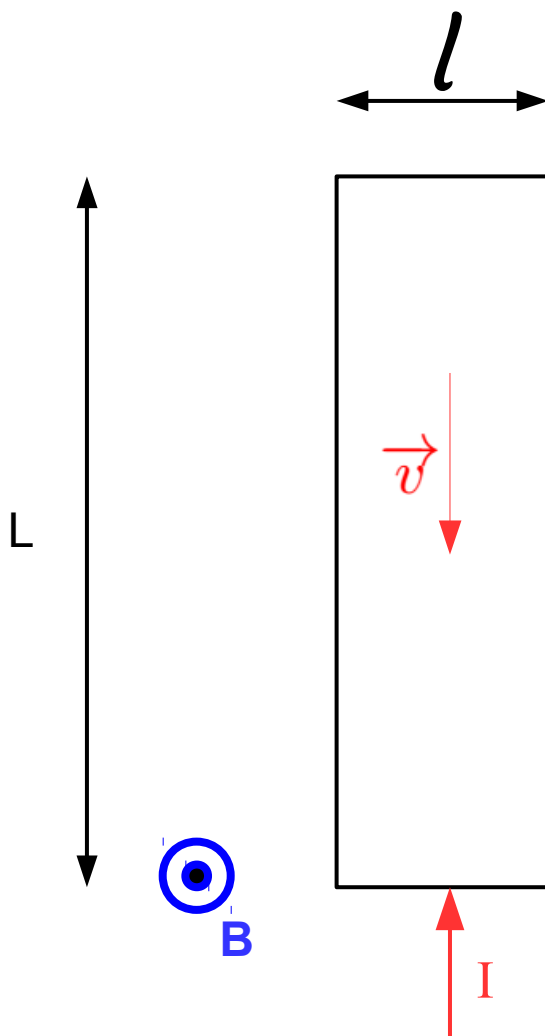
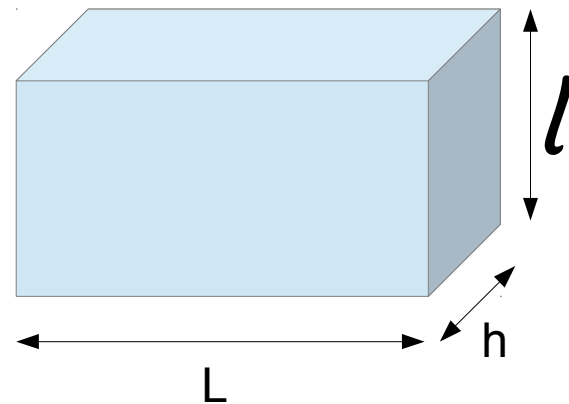
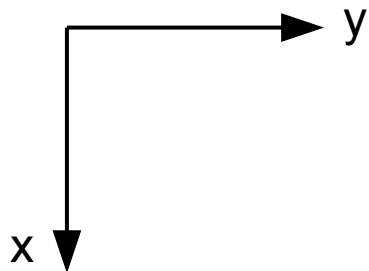
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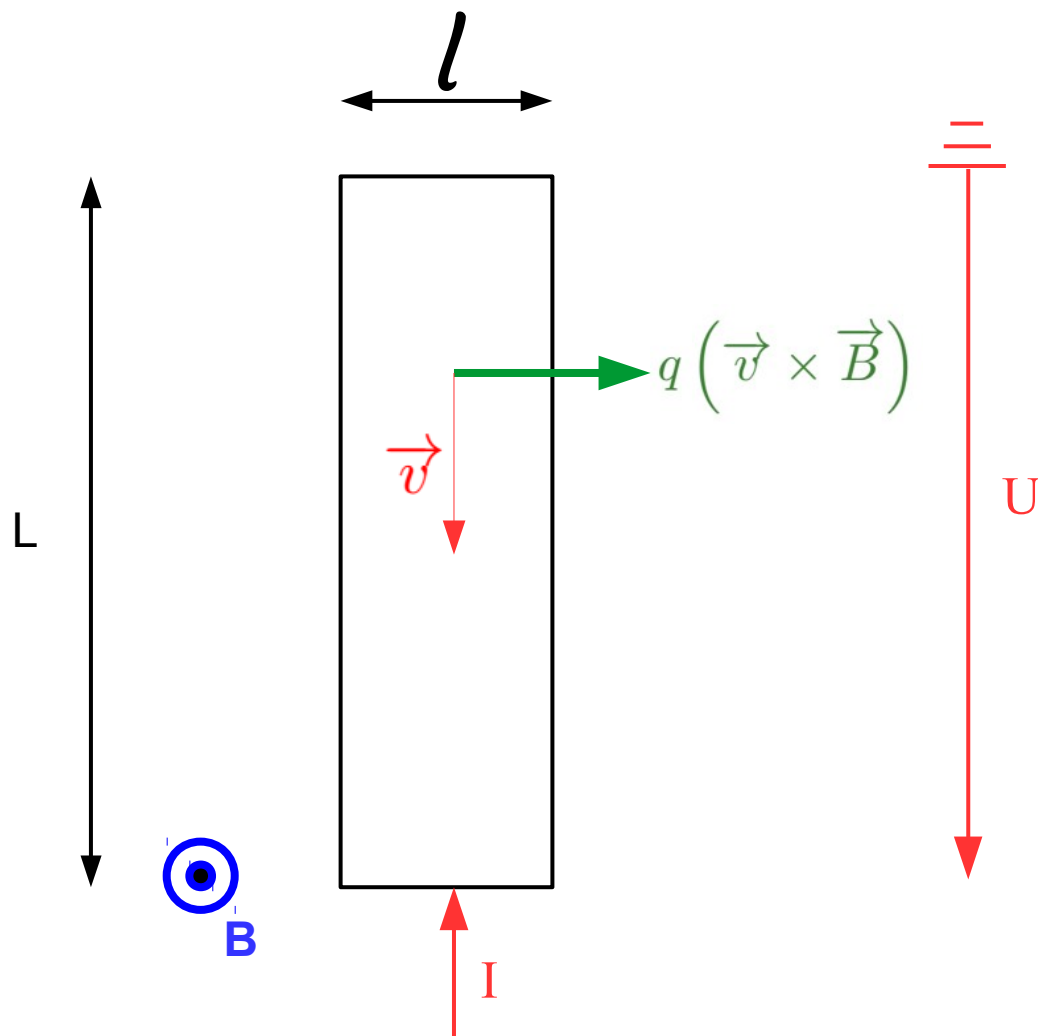
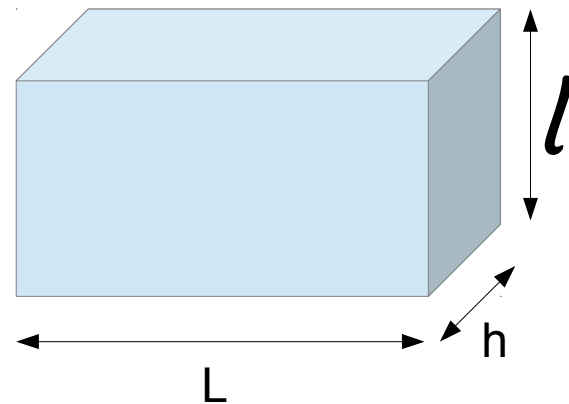
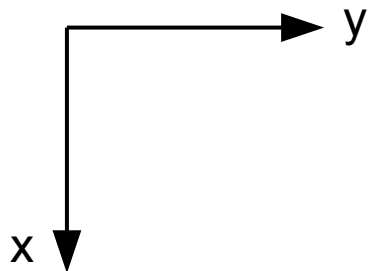
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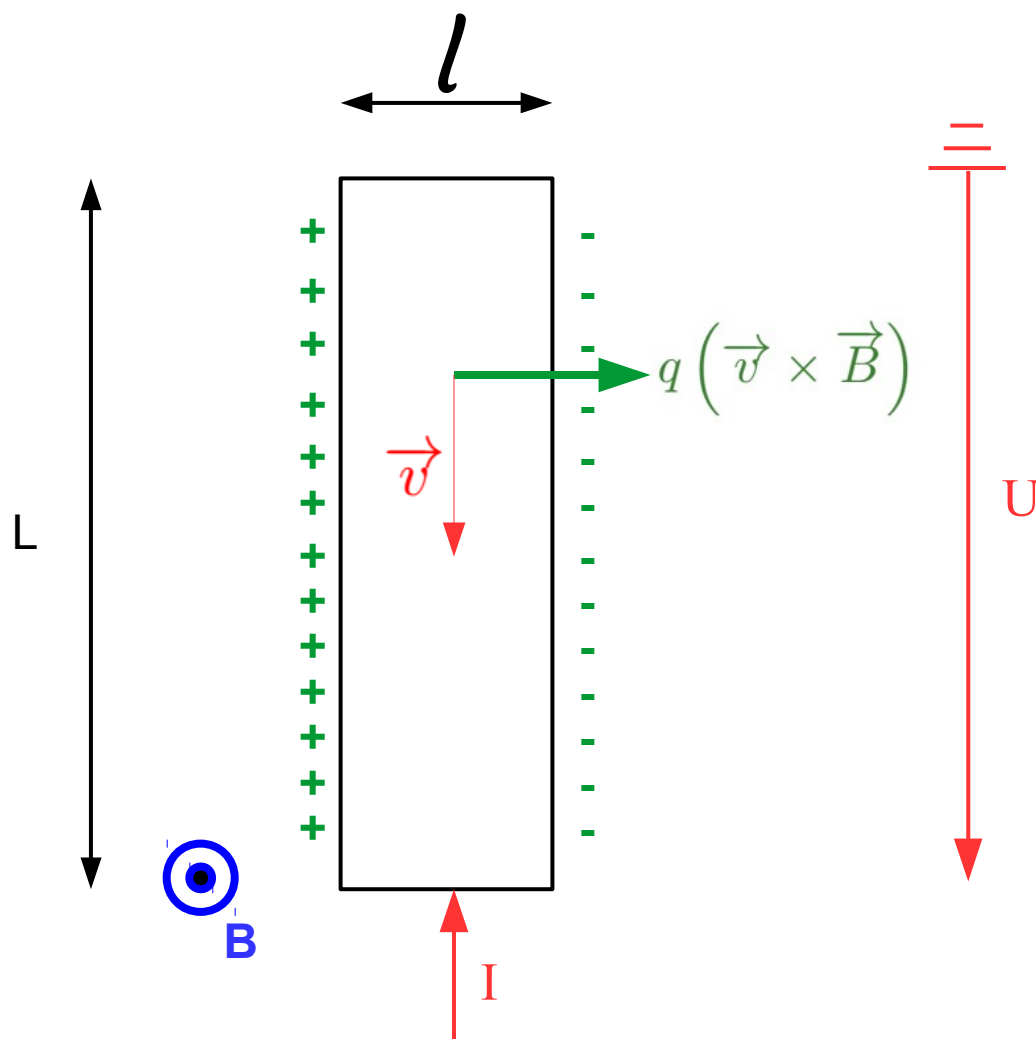
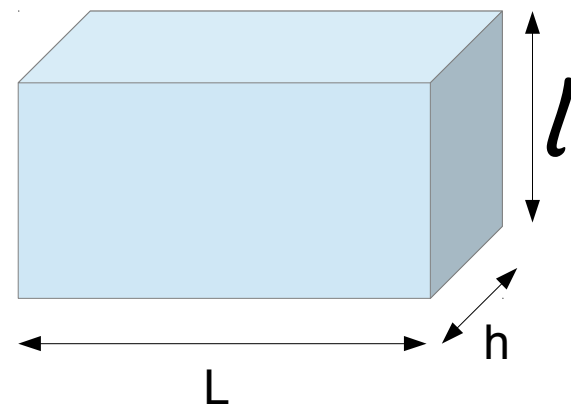
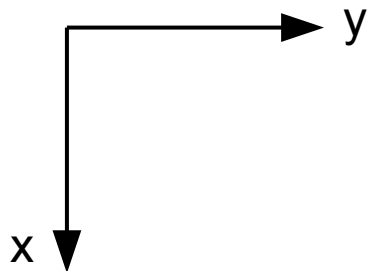
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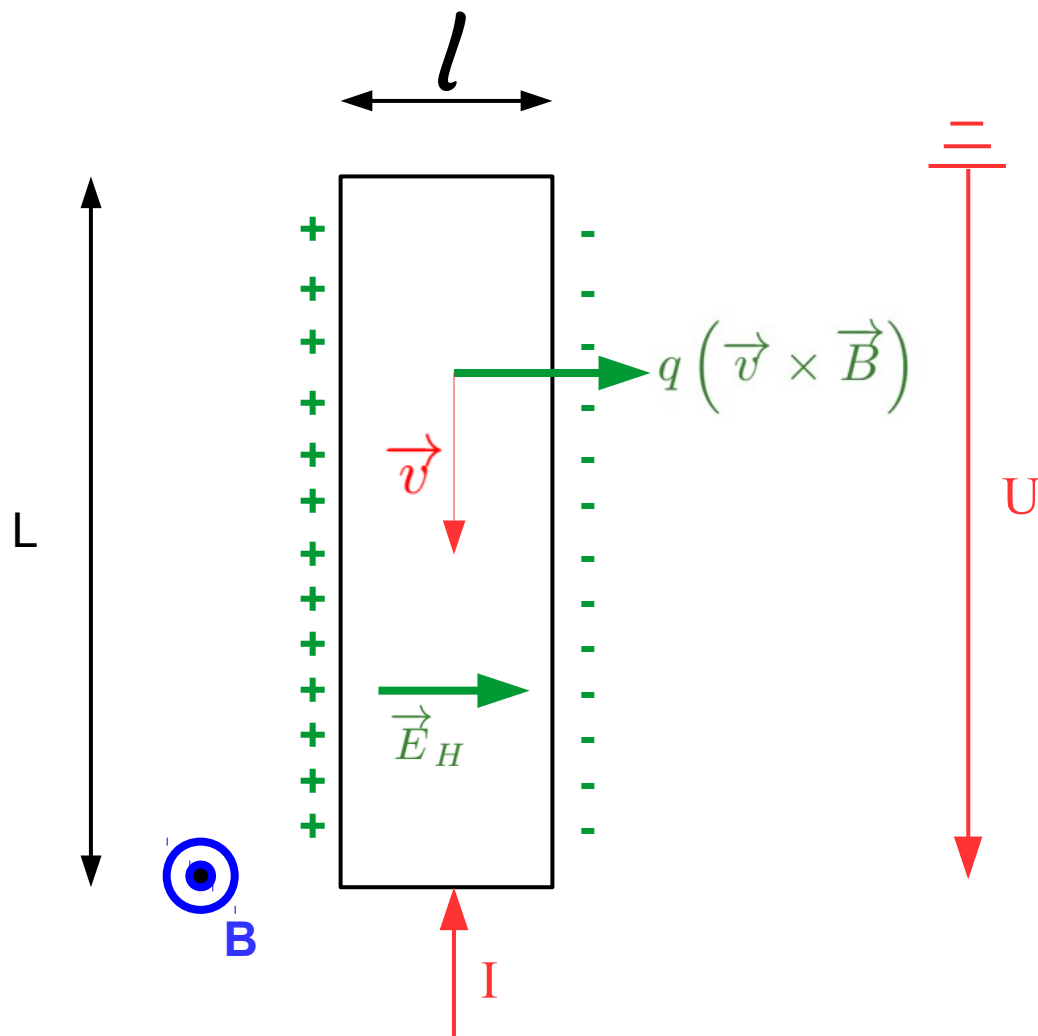
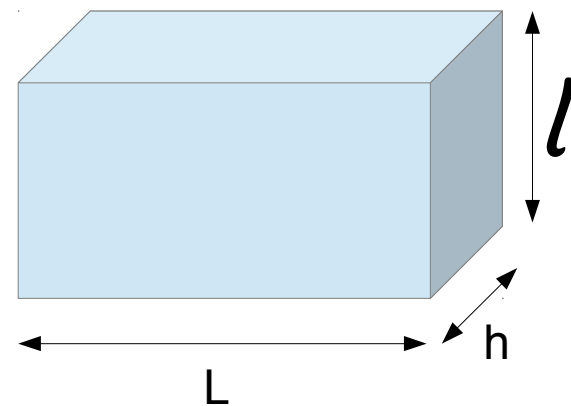
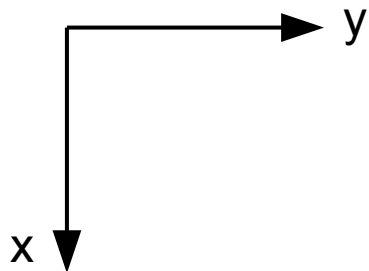
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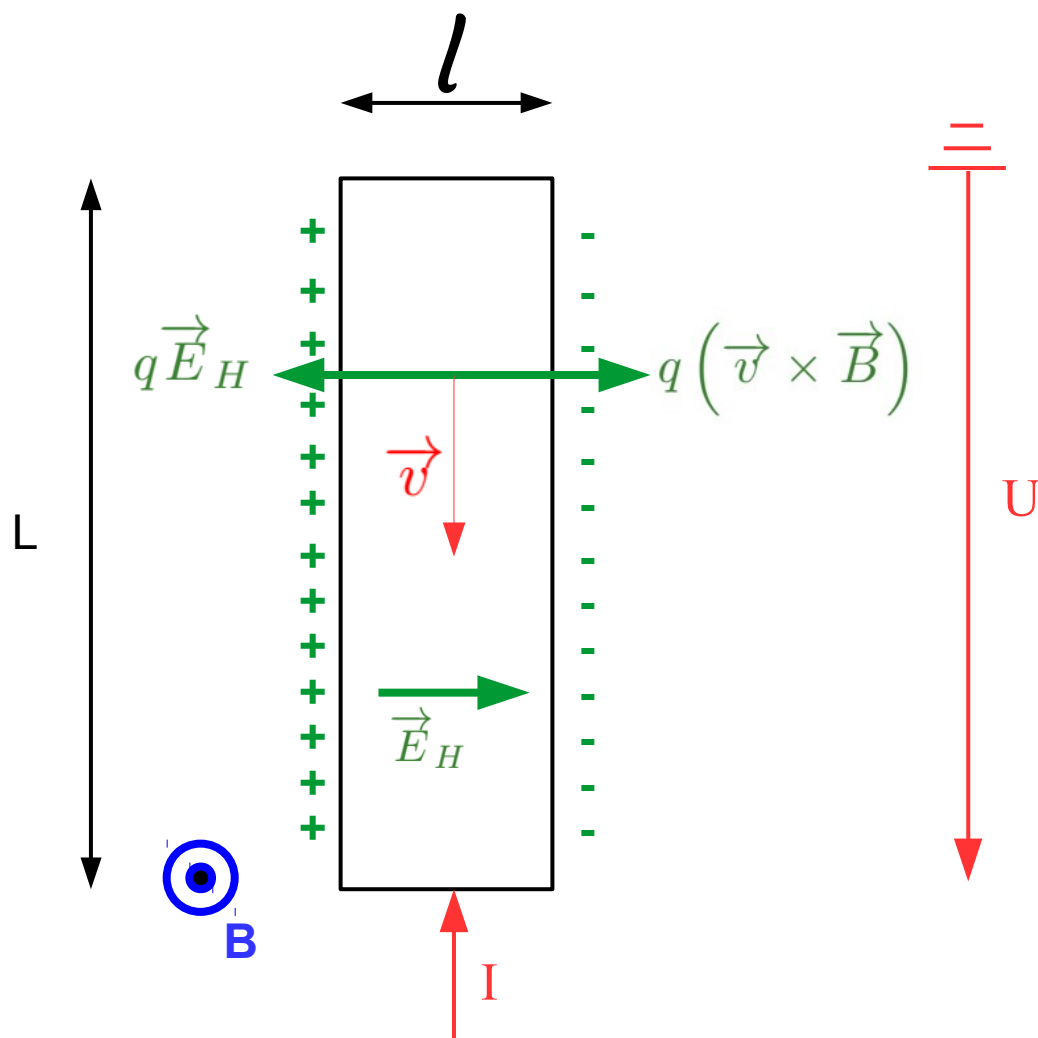
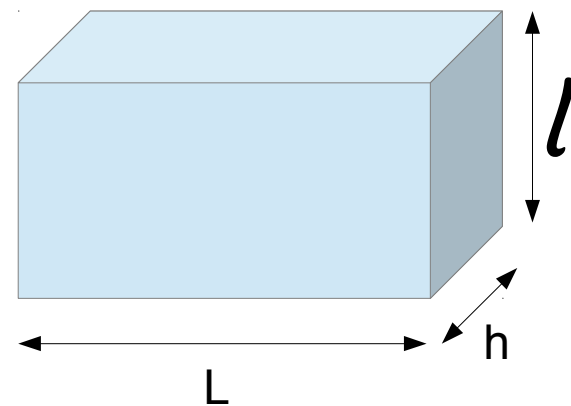
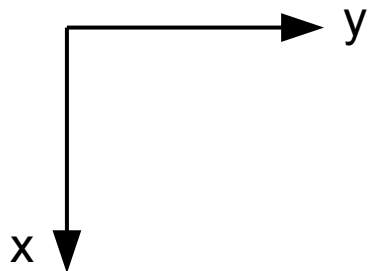
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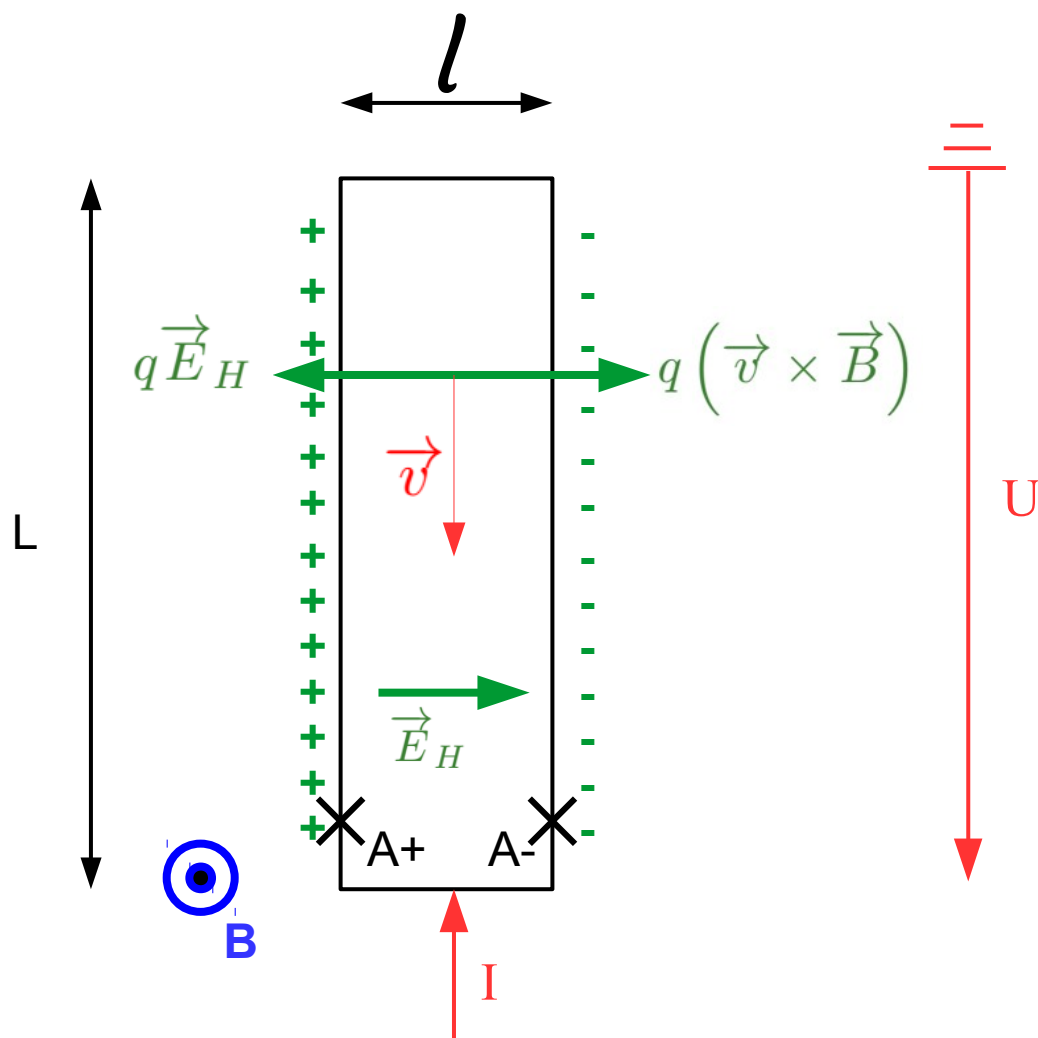
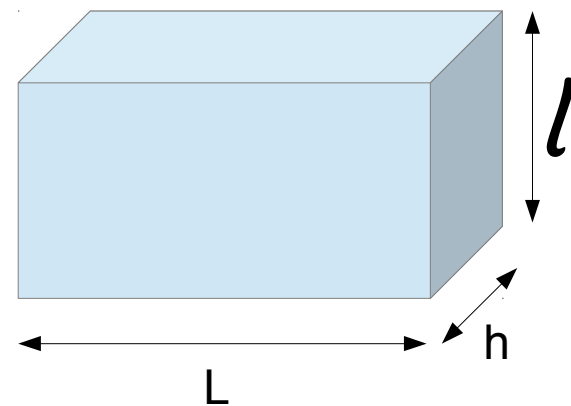
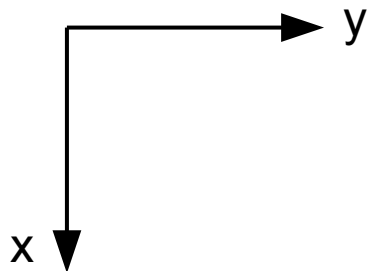
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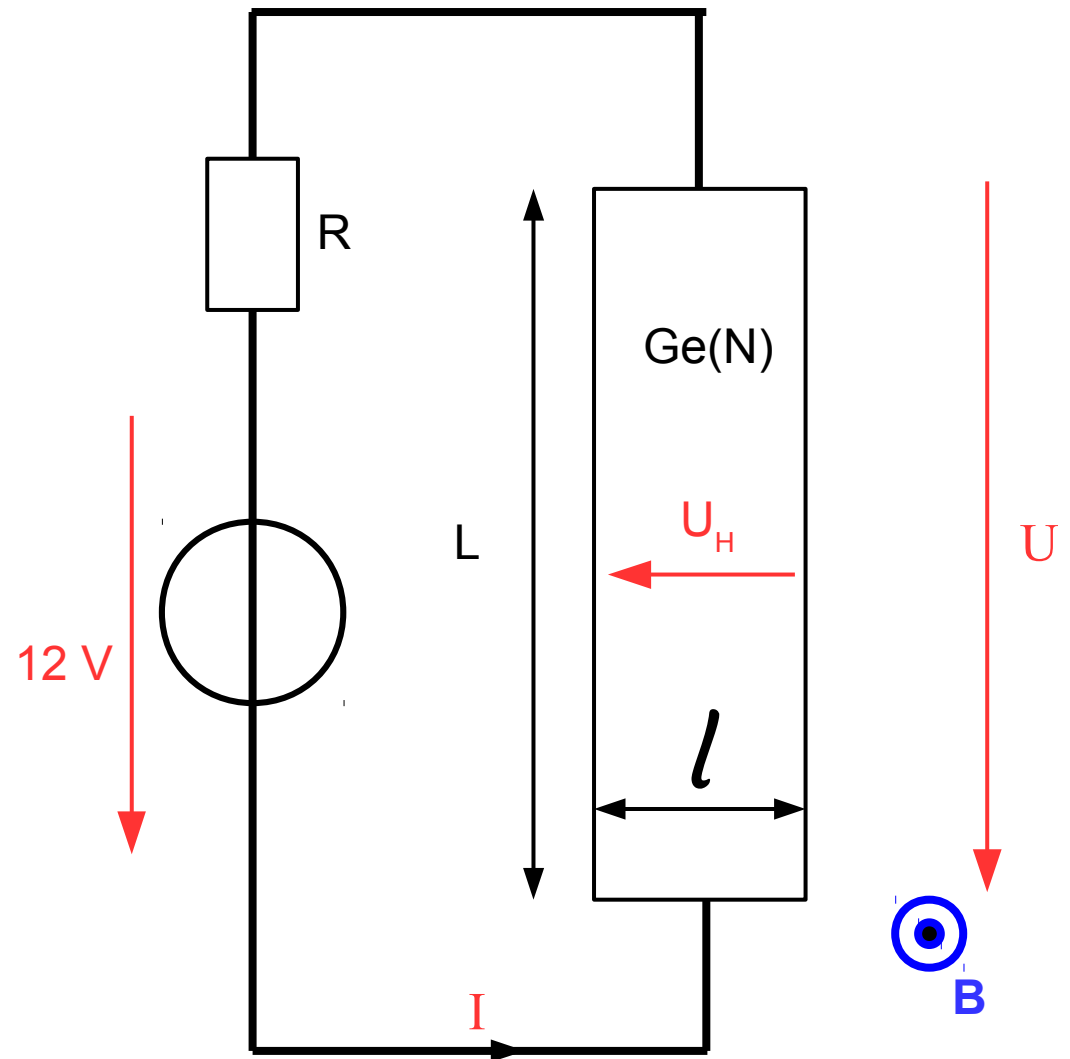
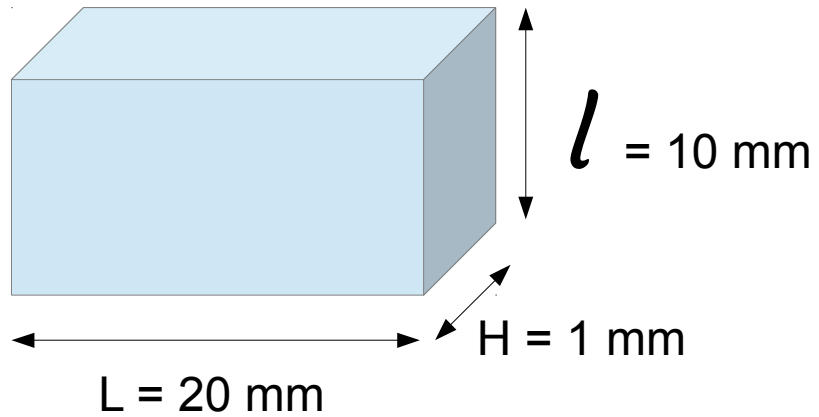


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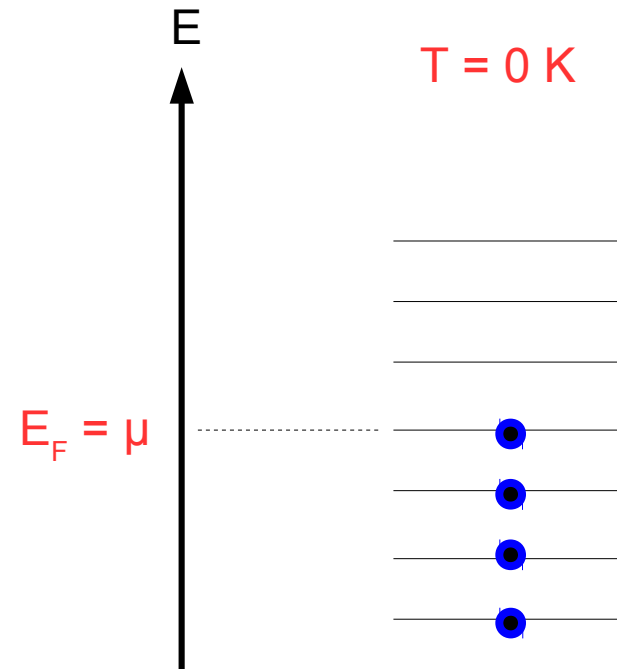
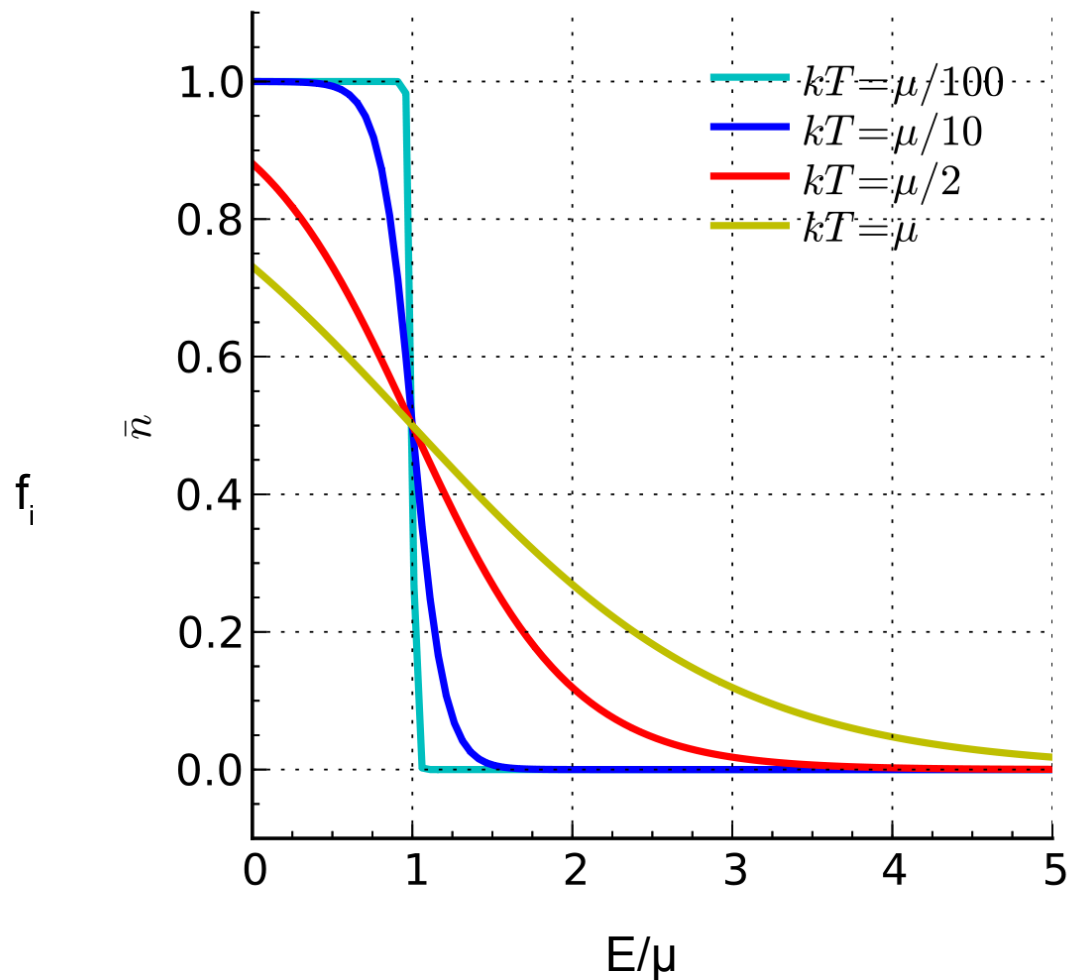
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Statistique de Fermi-Dirac

Les électrons sont des fermions : la **probabilité d'occupation** f_i d'un niveau est donnée par :

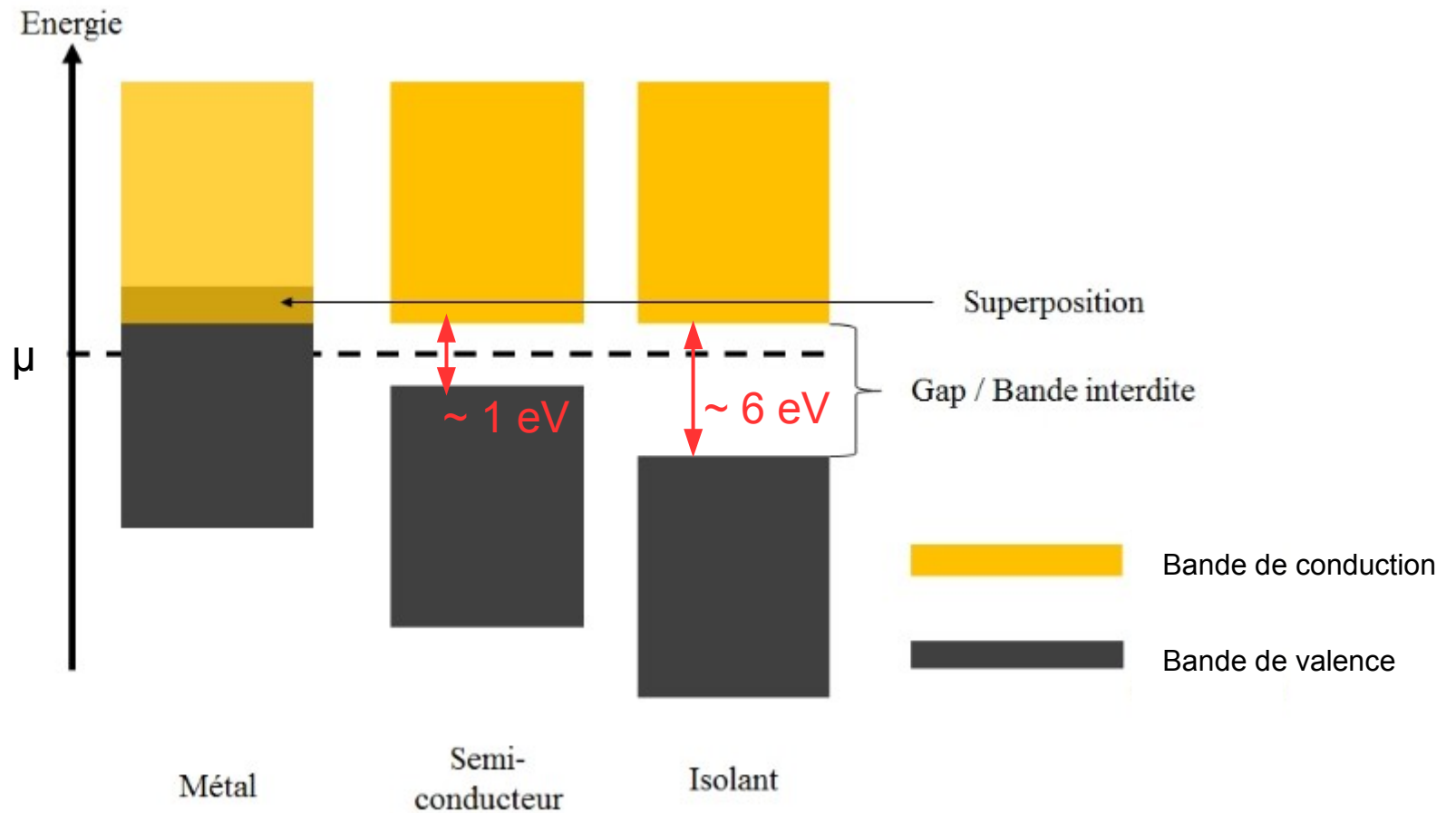
$$f_i = \frac{1}{\exp\left(\frac{E_i - \mu}{k_B T}\right) + 1}$$



L'énergie du dernier niveau occupé est appelée **énergie de Fermi** E_F

Structure de bandes

Différences entre conducteur, isolant, semi-conducteur



Dopage d'un semi-conducteur

