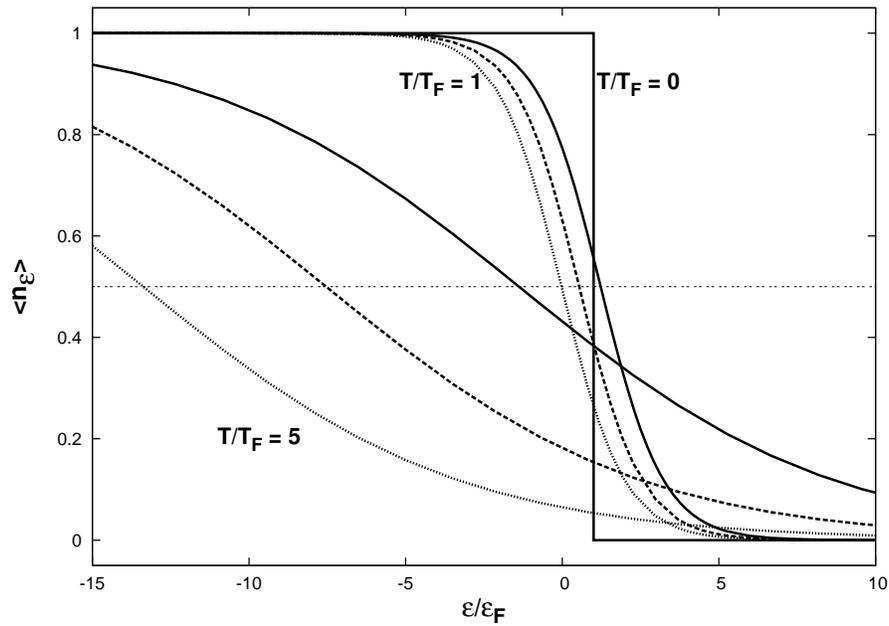


Ideal Fermi-Dirac gas: average level occupancy [tsl44]

Average occupancy of 1-particle state at energy ϵ if system (with fixed \mathcal{N}, V) is at temperature T :

$$\langle n_\epsilon \rangle = \frac{1}{e^{\beta(\epsilon-\mu)} + 1} \quad \text{with } \mu(T) \text{ from [tex117].}$$



- $\mathcal{D} = 1$: solid line,
- $\mathcal{D} = 2$: dashed line,
- $\mathcal{D} = 3$: dotted line.

Note: $\langle n_\epsilon \rangle = \frac{1}{2}$ occurs at $\epsilon = \mu(T)$.

Limit $T \rightarrow 0$: $\mu(T) \rightarrow \epsilon_F$, $\langle n_\epsilon \rangle \rightarrow \Theta(\epsilon_F - \epsilon)$.

Note: energy levels at $\epsilon < 0$ only exist in some applications.