5/3-2013 | Rep

Frågestund på Måndag H221 {10-12, 13-15.}

kap 2. $\bar{E}_{kin} = \frac{p_x^2}{2m_e} + \frac{p_y^2}{2m_e} + \frac{p_z^2}{2m_e}$ (mv_x)

Inga φ, λ, k. | $\mathcal{E} \neq 0 \Rightarrow \bar{F} = e\bar{\mathcal{E}} = m_e \bar{a}$

drifthastighet $\vec{v}_d = \vec{a} \times \tau$ ← medeltid mellan kollisioner.

σ = antal e^- × deras ladd × deras fart

$\sigma = \frac{1}{\rho}$; Mobilitet: $\mu = \frac{e\tau}{m}$; $\sigma = ne\mu$.

C_V

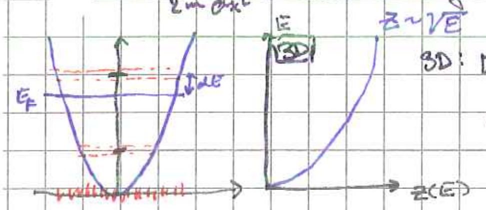
- elektroner: $C_V = \frac{dE}{dT}$; E/partikel } C_V/partikel $= \frac{3}{2}k$
- E/partikel $= \frac{3}{2}kT$; experiment ≈ 0 ???

atomer: $\bar{E}$/atom $= 3kT$; E/dim $= \frac{1}{2}kT + \frac{1}{2}kT$ } C_V/atom $= 3k$

Halleffekt ⇒ finns pos. laddningsbärare (2)

SE: $H\Psi = E\Psi$ $E = \frac{\hbar^2 k_n^2}{2m}$ $k = \frac{2\pi}{\lambda}$; $k = \frac{2\pi}{L}n$ $n = 0, \pm1, \pm2 \ldots$ $\psi \sim e^{ikx}$

$H = -\frac{\hbar^2}{2m}\frac{d^2}{dx^2}$ ← kin energi.



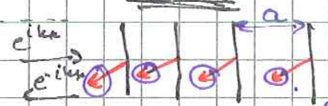
3D: $E = \frac{\hbar^2}{2m}(k_x^2 + k_y^2 + k_z^2)$

$F(E) = \frac{1}{e^{(E-E_F)/kT} + 1}$ [J/K]

$kT @ 300K \sim \frac{1}{40}$ eV

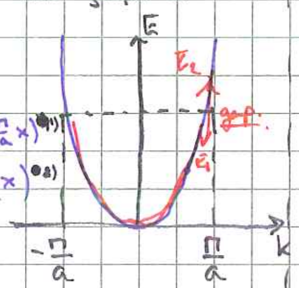
Kvant: Pauli spelar roll $\bar{E}_{kin} = \frac{3}{2}kT$

Klassiska gränsen: antal tillstånd > antal elektroner. $F(E) \ll 1$ $\bar{E}_{kin} = \frac{3}{5}E_F(T=0)$



$\psi \sim e^{i\frac{\pi}{a}x} \pm e^{-i\frac{\pi}{a}x}$ → $\cos(\frac{\pi}{a}x)$ (1) ; → $\sin(\frac{\pi}{a}x)$ (2)

$|e^{ikx}|^2 = 1$.



- 1) $E_1 = E_{kin} - \frac{V_0}{2}$
- 2) $E_2 = E_{kin} + \frac{V_0}{2}$

$E_2 > E_1$

grupphastighet $v_g = \frac{1}{\hbar}\frac{\partial E}{\partial k}$

$\frac{1}{m_e^*} = \frac{1}{\hbar^2}\frac{\partial^2 E}{\partial k^2}$ $F_{ext} = \frac{dv_g}{dt} \cdot m_e^*$ $F = \frac{dv}{dt} m$