

### 3 Dispersion durch ein Elektronengas

$$\dot{v} = -\frac{1}{\tau} v \Rightarrow v(t) = v(0) \exp\left\{-\frac{t}{\tau}\right\}$$

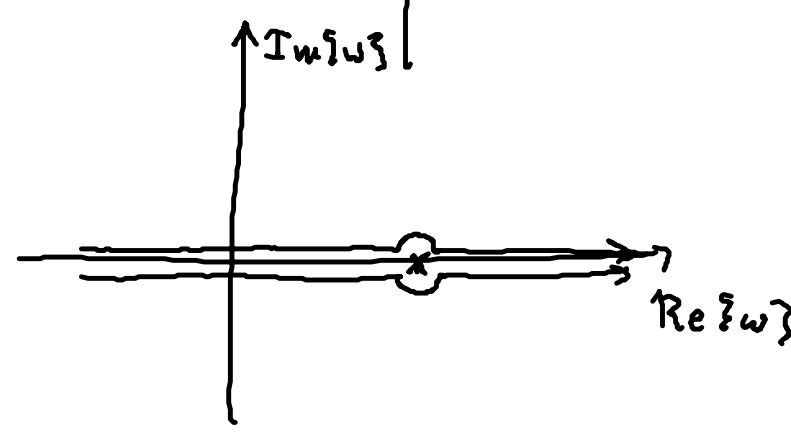
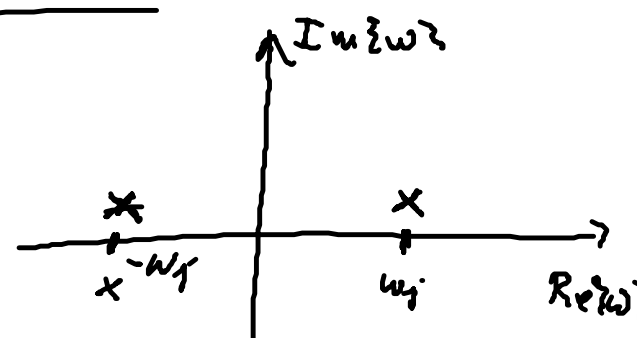
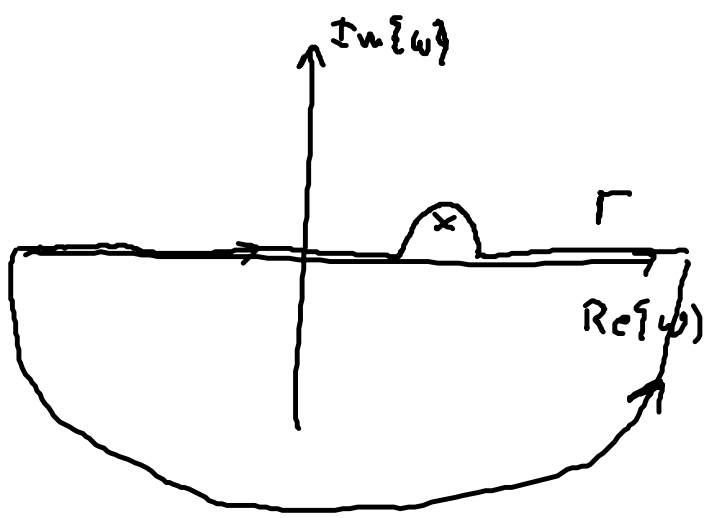
Kristall:  $E_L = \frac{\hbar^2 k^2}{2m^*} \Rightarrow \hbar k = m^* v$  Impuls

Driftgeschwindigkeit  $\vec{j} = -\sigma E = -e_0 n \vec{v}_D \Rightarrow \vec{v}_D = \frac{\sigma}{e_0 n} \vec{E}$

Thermische Geschwindigkeit:  $\frac{1}{2} m^* \overline{v_{th}^2} = \frac{3}{2} k_B T$

$$f(\omega) = \frac{Ne^2}{\epsilon_0 m} \sum_j \frac{f_j}{\omega_j^2 - \omega^2 + i\omega\gamma_j}$$

$$\omega = \pm \sqrt{\omega_j^2 + i\omega\gamma_j}$$



$$\mathcal{P} \int_{-\infty}^{+\infty} f(x) dx = \lim_{\epsilon \rightarrow 0} \left[ \int_{-\infty}^{x_0 - \epsilon} f(x) dx + \int_{x_0 + \epsilon}^{+\infty} f(x) dx \right]$$

$$\mathcal{P} \int_{-\infty}^{+\infty} \dots = \frac{1}{2} \int_{-\infty}^{\dots} \dots + \frac{1}{2} \int_{\dots}^{+\infty} \dots$$

$$-\frac{1}{\pi i} \mathcal{P} \int_{-\infty}^0 \frac{\omega' f(\omega') d\omega'}{\omega'^2 - \omega^2} = \frac{-1}{2i\pi} \mathcal{P} \int_{\infty}^0 \frac{\omega' f(-\omega') d\omega'}{\omega'^2 - \omega^2} = \frac{-1}{2i\pi} \mathcal{P} \int_0^{\infty} \frac{-\omega' f^*(\omega') d\omega'}{\omega'^2 - \omega^2}$$