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- ▶ standard thermodynamics

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- ▶ $\Gamma(M, V, \tau) = \text{tr } G \frac{i}{\hbar}[M(\tau), V]$
- ▶ this is a Green's or influence function

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- ▶ Suszeptibility tensor defined by

$$\chi_{ij}(\omega, \mathbf{q}) = \frac{1}{\epsilon_0} \int_0^\infty d\tau e^{i\omega\tau} \int d^3\xi e^{-i\mathbf{q} \cdot \boldsymbol{\xi}} \Gamma_{ij}(\tau, \boldsymbol{\xi})$$

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- ▶ spatial dispersion, optical activity