

In the presence of weak disorder of quenched Gaussian random fields

$$\mathcal{S}_{\text{dis}} = \int d^2r d\tau \left[V(\mathbf{r}) c^\dagger c + h(\mathbf{r}) \phi \right] ,$$

$$\begin{aligned} \overline{V(\mathbf{r})} &= 0 & ; & & \overline{V(\mathbf{r})V(\mathbf{r}')} &= V_0^2 \delta(\mathbf{r} - \mathbf{r}') , \\ \overline{h(\mathbf{r})} &= 0 & ; & & \overline{h(\mathbf{r})h(\mathbf{r}')} &= h_0^2 \delta(\mathbf{r} - \mathbf{r}') , \end{aligned}$$

we use the memory-function approach to obtain the *resistivity* for current along angle ϑ

$$\rho(T) = \frac{1}{\chi_{\mathbf{J},\mathbf{P}}^2} \lim_{\omega \rightarrow 0} \int \frac{d^2k}{(2\pi)^2} k^2 \cos^2(\theta_{\mathbf{k}} - \vartheta) \left(V_0^2 \frac{\text{Im } \Pi_{c^\dagger c}^R(\omega, \mathbf{k})}{\omega} + h_0^2 \frac{\text{Im } D_\phi^R(\omega, \mathbf{k})}{\omega} \right) .$$