1D superconductor without spin-orbit coupling

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Hamiltonian

$$H^{BdG}_{\mathbf{k}}(t) = \left[w_0\left(e^{i(\tau^z\mathbf{k}+\vec{\phi}t)\cdot\mathbf{a}} + e^{-i(\tau^z\mathbf{k}+\vec{\phi}t)\cdot\mathbf{a}}\right) - \mu\right]\tau^z\otimes\sigma^0 - \tau^0\otimes\vec{B}\cdot\vec{\sigma} + \Delta\tau^x\otimes\sigma^0$$

$$w_k(t=0) = 2w_0\cos(k)\tau_z\sigma_0$$

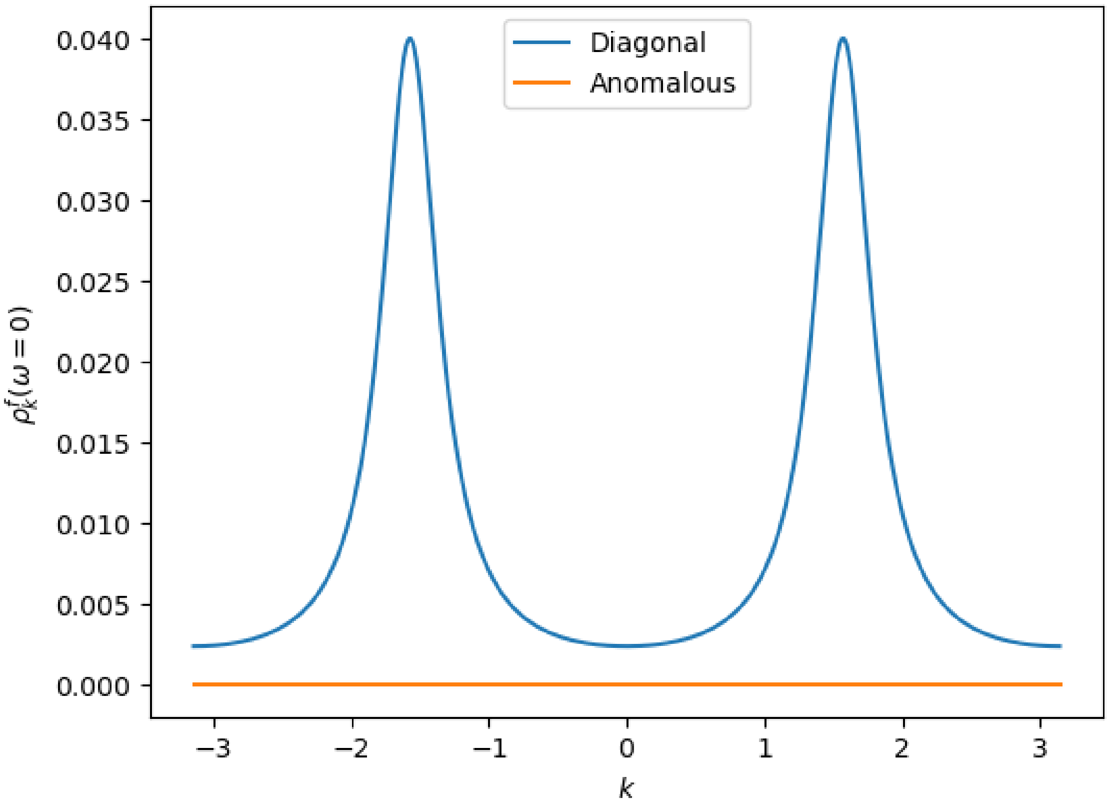
$$G^f_k(t=0,\omega=0) = \left[-(w_k(t=0) - B_x\tau_0\sigma_x - B_y\tau_0\sigma_y + \Delta\tau_x\sigma_0) + i\Gamma\tau_0\sigma_0\right]^{-1}$$

$$\rho^f_k(\theta,\omega) = G^f_k(\theta,\omega)\Gamma\tau_0\sigma_0[G^f_k(\theta,\omega)]^\dagger$$

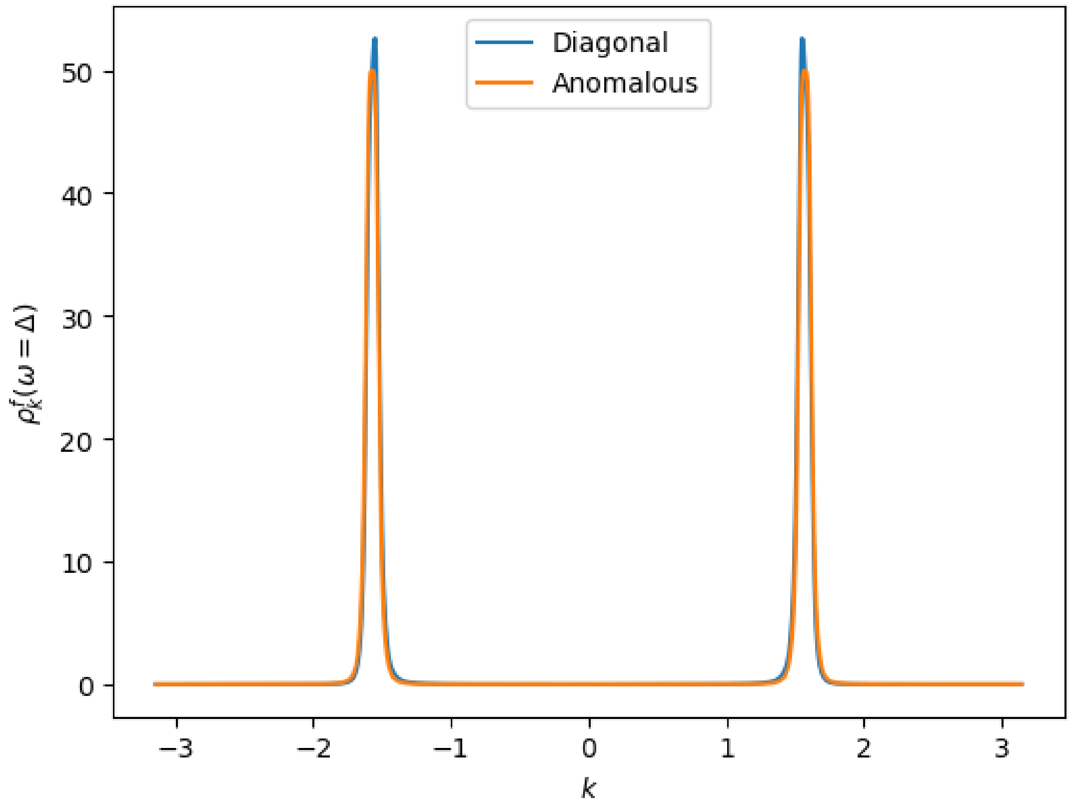
$$v(k) = -2w_0 sin(k)\tau_0\sigma_0$$

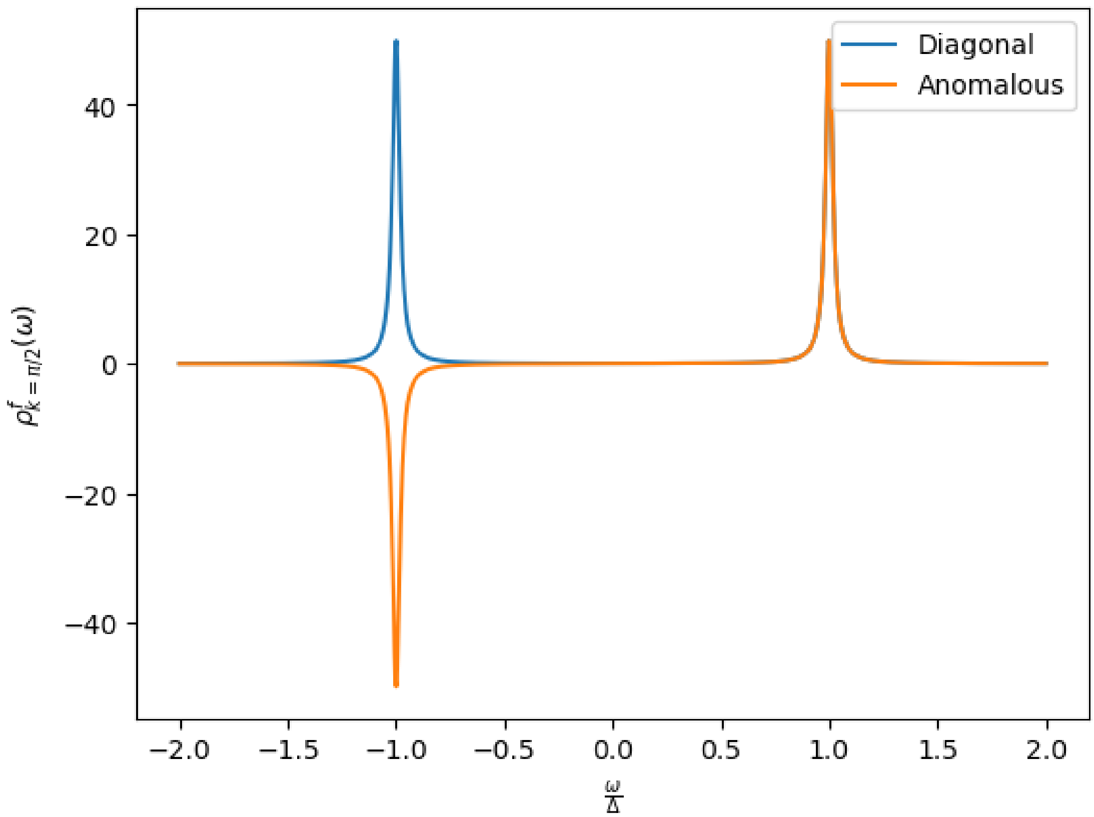
$$\sigma = -\frac{1}{4}\sum_{k=-\pi}^{\pi}\int\frac{d\omega}{2\pi}v(k)\frac{\partial f}{\partial\omega}\rho(0,\omega)^2 v(k)$$

Zero temperature $\omega = 0$



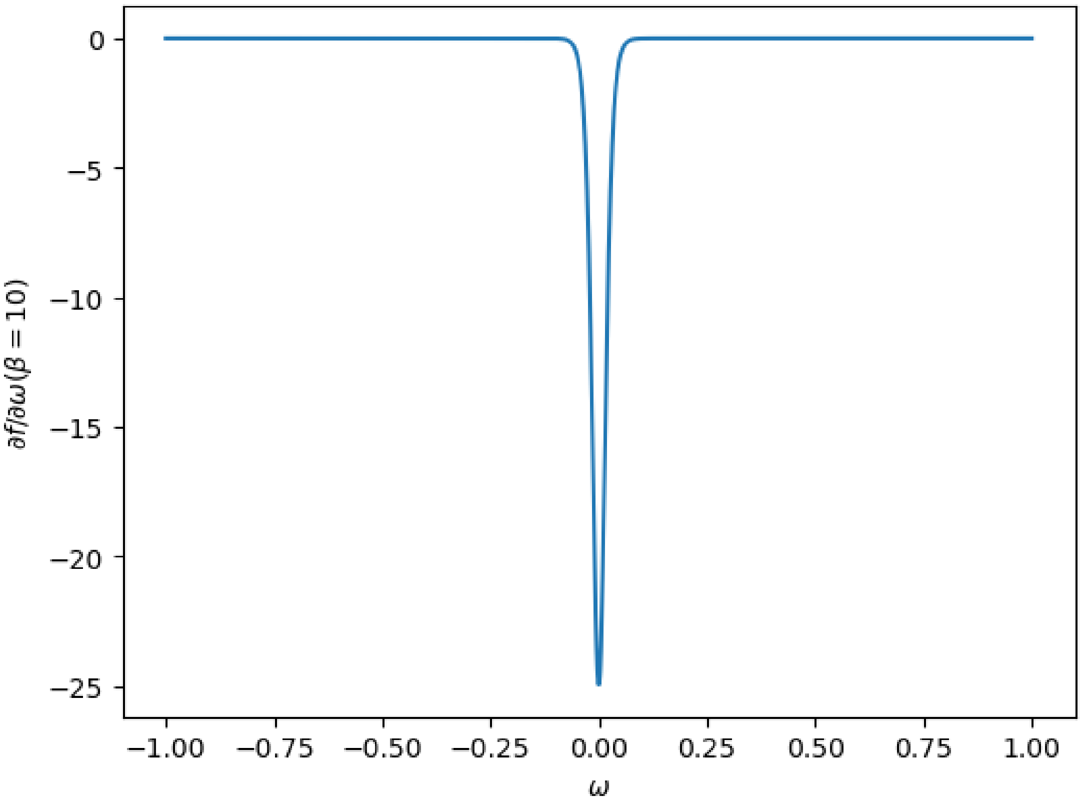
Finite temperature $\omega = \Delta$





Diagonal
Anomalous
40
20
0
−20
−40
$\rho^f_{k=\pi/2}(\omega)$
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0
$\frac{\omega}{\Delta}$

Fermi function derivative $\beta = 100$

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(31.083480456871488-5.62375002720565e-17j)
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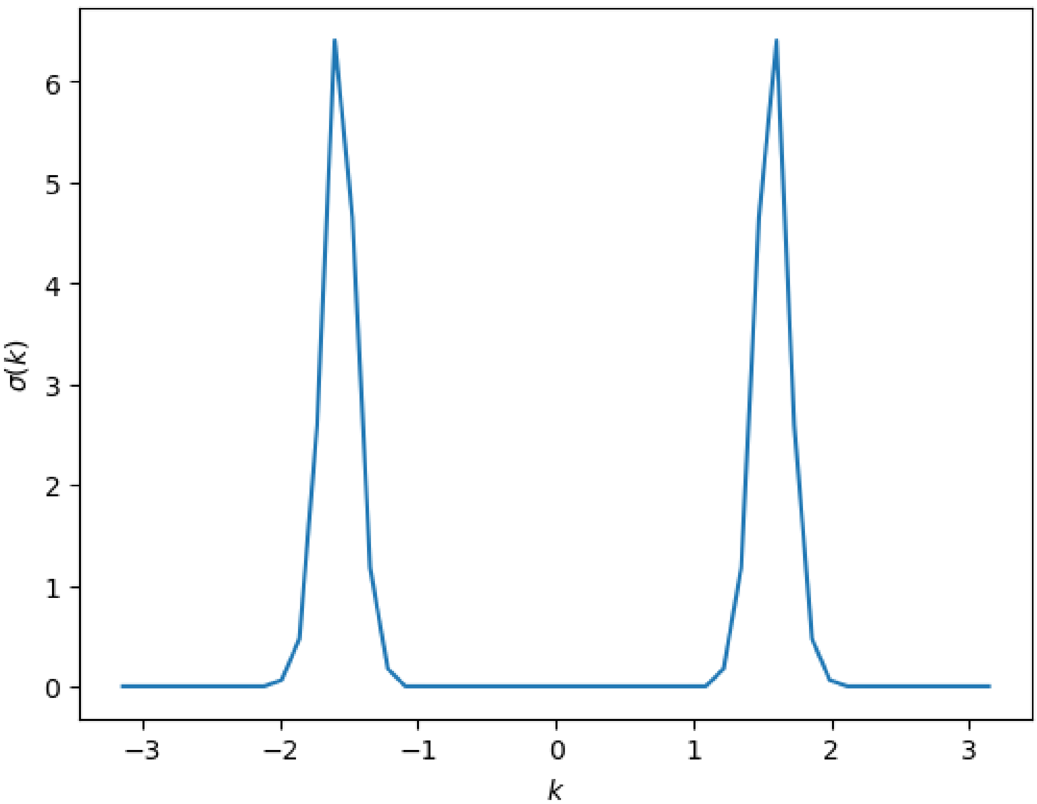
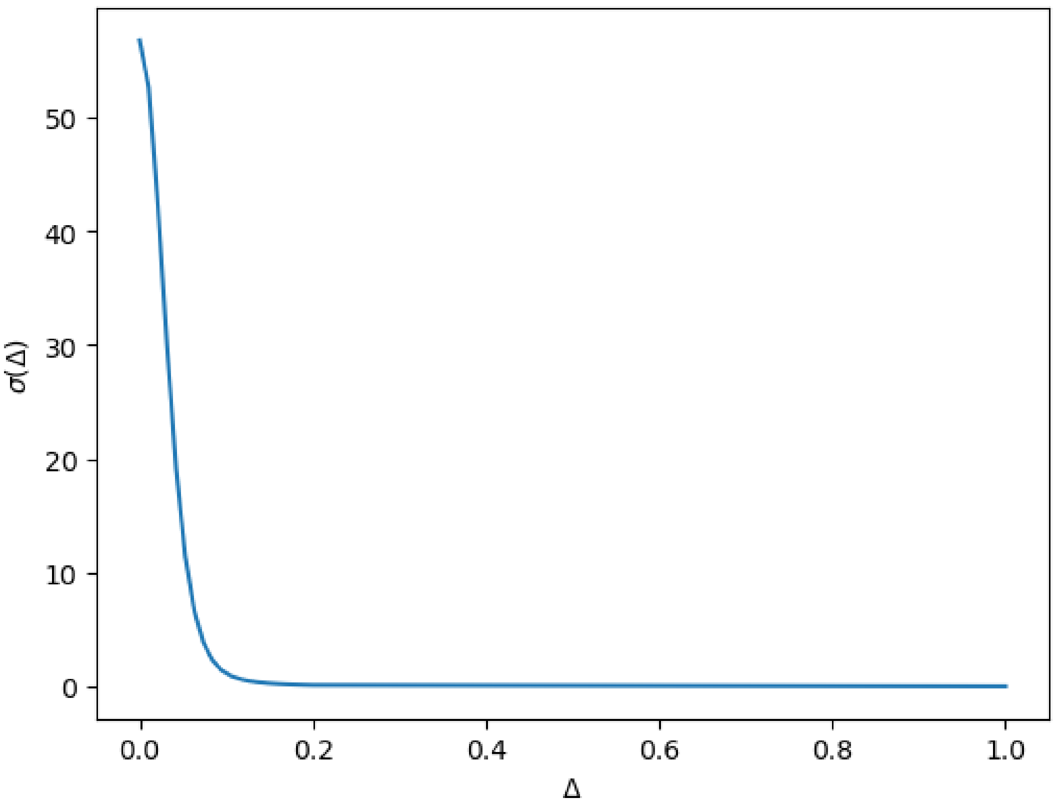

σ(k)
k
0
1
2
3
4
5
6
−3
−2
−1
0
1
2
3



50
40
30
20
10
0
σ(Δ)
0.0
0.2
0.4
0.6
0.8
1.0
Δ