$$iG^0(\vec{x}t,\vec{x}'t') = \sum_{kk'} \phi_k(\vec{x})\phi^*_{k'}(\vec{x}')\, e^{-i\omega_k t} e^{i\omega_{k'} t'} \langle \bar{\Phi}_0 | a_k a^\dagger_{k'} | \bar{\Phi}_0 \rangle\, \vartheta(t-t')$$
$$- \sum_{kk'} \phi_k(\vec{x})\phi^*_{k'}(\vec{x}')\, e^{-i\omega_k t} e^{i\omega_{k'} t'} \langle \bar{\Phi}_0 | a^\dagger_{k'} a_k | \bar{\Phi}_0 \rangle\, \vartheta(t'-t)$$

$$\langle \bar{\Phi}_0 | a_k a^\dagger_{k'} | \bar{\Phi}_0 \rangle = \delta_{kk'}\, \vartheta(k-k_F)$$

$$\langle \bar{\Phi}_0 | a^\dagger_k a_{k'} | \bar{\Phi}_0 \rangle = \delta_{kk'}\, \vartheta(k_F-k)$$

$$\phi_k(\vec{x}) = e^{-i\vec{k}\vec{x}}\frac{1}{\sqrt{V}}$$

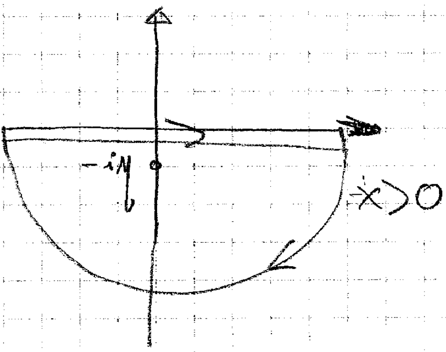
$$iG^0(\vec{x}t,\vec{x}'t') = \frac{1}{V}\sum_k e^{i\vec{k}(\vec{x}-\vec{x}')}\, e^{-i\omega_k (t-t')}$$
$$\left[\vartheta(t-t')\vartheta(k-k_F) - \vartheta(t'-t)\vartheta(k_F-k)\right] \quad \varepsilon$$

Nel limite per volume infinito si ha che:

$$\frac{1}{V}\sum_k \longrightarrow \frac{1}{(2\pi)^3}\int d^3k$$

Rappresentazione integrale della funzione gradino

$$\vartheta(x) = -\int_{-\infty}^{\infty} \frac{dk}{2\pi i}\, \frac{e^{-ikx}}{k+i\eta}$$



$$-\lim_{k\to -i\eta} 2\pi i\, \frac{1}{2\pi i}(k+i\eta)\frac{e^{-ikx}}{(k+i\eta)} = -e^{-\eta x}$$

$$\lim_{\eta\to 0}\left(-e^{-\eta x}\right) = -1 \quad \text{per } x>0$$
$$= 0 \quad \text{per } x<0$$

direzione del circuito

altro circuito senza poli