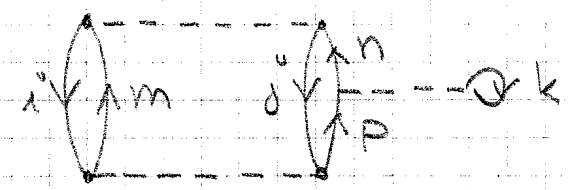
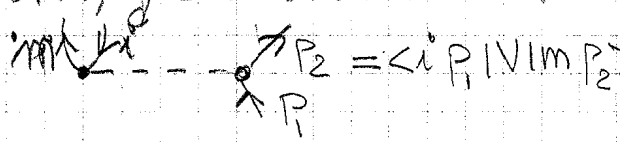
Diagramma di Goldstone



Uso la convenzione in ogni punto, freccia che entra a sinistra, freccia che esce a destra



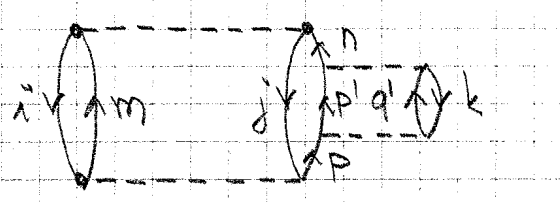
$$\langle \bar{\Phi}_0 | V \uparrow (E_0 - H_0)^{-1} \uparrow \quad V \uparrow (E_0 - H_0)^{-1} \uparrow \quad V | \bar{\Phi}_0 \rangle$$

$$|imjp\rangle\langle imjp| \quad |imjp\rangle\langle imjp| \quad |imjn\rangle\langle imjn| \quad |imjn\rangle\langle imjn|$$

$$\langle imjp|V|imjn\rangle = \langle \bar{\Phi}_0 | a_p a_j^\dagger a_m^\dagger a_i^\dagger \sum_{\alpha\beta\alpha'\beta'} V_{\alpha\beta\alpha'\beta'} a_\alpha^\dagger a_\beta^\dagger a_{\beta'} a_{\alpha'} a_i^\dagger a_m^\dagger a_j a_n^\dagger | \bar{\Phi}_0 \rangle$$

$$= \sum_k \langle pk|V|nk\rangle$$

$$\langle ij|V|mp\rangle (\epsilon_i + \epsilon_j - \epsilon_m - \epsilon_p)^{-1} \left[\sum_k \langle pk|V|nk\rangle \right] (\epsilon_i + \epsilon_j - \epsilon_m - \epsilon_n)^{-1} \langle mn|V|ij\rangle$$



$$\langle \bar{\Phi}_0 | V \underbrace{(E_0 - H_0)^{-1}}_{|imjp\rangle\langle imjp|} V \underbrace{(E_0 - H_0)^{-1}}_{\sum_{p'q'} |imjp'q'k\rangle\langle imjp'q'k|} V \underbrace{(E_0 - H_0)^{-1}}_{|imjn\rangle\langle imjn|} V | \bar{\Phi}_0 \rangle$$

$$\langle imjp|V|imjp'q'k\rangle$$

$$= \sum_{\alpha\beta\alpha'\beta'} V_{\alpha\beta\alpha'\beta'} \langle \bar{\Phi}_0 | a_p a_j^\dagger a_m^\dagger a_i^\dagger a_\alpha^\dagger a_\beta^\dagger a_{\beta'} a_{\alpha'} a_i^\dagger a_m^\dagger a_{p'}^\dagger a_{q'}^\dagger a_k | \bar{\Phi}_0 \rangle$$

$$= \langle pk|V|p'q'\rangle$$