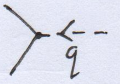
External states for scalar field:



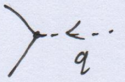
$$= \phi_I^+(x)|q\rangle$$

$$= \int \frac{d^3k}{(2\pi)^3} \frac{1}{\sqrt{2E_{\vec{k}}}} a_{\vec{k}} e^{-i\vec{k}\cdot\vec{x}} \sqrt{2E_{\vec{q}}}\, a_{\vec{q}}^{\dagger}|0\rangle$$

$$= \int \frac{d^3k}{(2\pi)^3} \frac{1}{\sqrt{2E_{\vec{k}}}} \sqrt{2E_{\vec{q}}}\, e^{-i\vec{k}\cdot\vec{x}} \delta^3(\vec{k}-\vec{q})|0\rangle$$

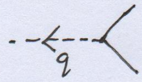
$$= e^{-i\vec{q}\cdot\vec{x}}|0\rangle .$$

Thus in momentum-space:



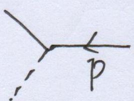
$$= \phi_I^+|q\rangle = 1 ,$$

Similarly:



$$= \langle q|\phi_I = 1$$

In the case of fermions:



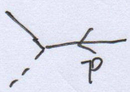
$$= \psi_I(x)|P,s\rangle$$

$$= \int \frac{d^3p'}{(2\pi)^3} \frac{1}{\sqrt{2E_{p'}}} \sum_{s'} a_{p'}^{s'} u^{s'}(p') e^{-i\vec{p}'\cdot\vec{x}} \sqrt{2E_p}\, a_p^{s\dagger}|0\rangle$$

$$= \int \frac{d^3p'}{(2\pi)^3} \frac{1}{\sqrt{2E_{p'}}} \sqrt{2E_p} \sum_{s'} \cancel{a_{p'}^{s'}} u^{s'}(p') e^{-i\vec{p}'\cdot x} \delta^4(p'-p)\delta_{s,s'}|0\rangle$$

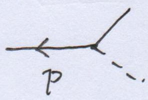
$$= u^s(p) e^{-i\vec{p}\cdot\vec{x}}|0\rangle$$

Thus in momentum-space:



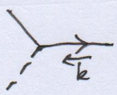
$$= \psi_I|P,s\rangle = u^s(p)$$

Similarly:

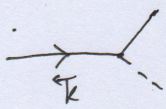


$$= \langle P,s|\bar{\psi}_I = \bar{u}^s(p)$$

for antifermions.



$$= \bar{\psi}_I|k,s\rangle = \bar{v}^s(k)$$



$$= \langle k,s|\psi_I = v^s(k)$$