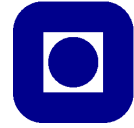


FY3464 Quantum Field Theory

Problemset 9

NTNU



Institutt for fysikk

Problem 1

Prove in detail that:

$$\bar{u}^s(-\mathbf{k})\gamma^0 v^r(\mathbf{k}) = 0. \quad (1)$$

Problem 2

In real space, the Dirac propagator S_F takes the form:

$$\begin{aligned} S_F(x-y)_{\alpha\beta} &\equiv \langle T\{\psi_\alpha(x)\bar{\psi}_\beta(y)\} \rangle \\ &= \int \frac{d^3k}{(2\pi)^3 2k^0} [\theta(x^0 - y^0) e^{-ik(x-y)} (\not{k} + m)_{\alpha\beta} - \theta(y^0 - x^0) e^{ik(x-y)} (\not{k} - m)_{\alpha\beta}]. \end{aligned} \quad (2)$$

Fourier-transform this expression and obtain the simplest expression you can for the propagator in momentum space, $\tilde{S}_F(k)$.