

Theoretical Physics 6a (QFT): SS 2022

Exercise sheet 7

06.06.2022

Exercise 1. (100+25 points): Scalar QED

(0)(0 points) How much time did you spend in solving this exercise sheet?

(a)(100 points) Calculate the square of amplitude for scalar QED Compton Scattering:

$$p + k = p' + k'$$

And write the differential cross section.

(b*)(Advanced level problem for those who are interested - 25 points)
Consider decay $1 \rightarrow 3$:

$$p_1 = p_2 + p_3 + p_4$$

It is possible if $m_1 > m_2 + m_3 + m_4$. Prove the formula for differential decay rate:

$$d\Gamma = \frac{dtd\Omega}{32(2\pi)^3 m_1^3} |M_{fi}|^2$$

Where denoted:

$$t = (p_1 - p_3)^2 = (p_2 + p_4)^2$$
$$u = (p_1 - p_4)^2 = (p_2 + p_3)^2$$

Literature

1. See exercise classes and lecture notes.
2. Quantum Electrodynamics, Berestetskii V.B., Pitaevskii L.P., Lifshitz E.M. - chapter 64.