

QFT

Chapter 50: Massless Particles and Spinor Helicity

Overview

- As problem 49.1 showed, calculating scattering amplitudes can be a real pain in the butt.
 - In “real life”, these are usually calculated numerically, using software written for this purpose.
 - If we can approximate or assume that particles are massless, this becomes much easier.
- This method is called spinor helicity, because the massless particles must have a definite helicity for this to work.

Twistors

- For a u spinor with negative helicity, we know that

$$u_{-}(\vec{p})\bar{u}_{-}(\vec{p}) = \frac{1}{2}(1 \mp \gamma_5)(\not{p})$$

- This is a projection operator. We know that two components of the spinor will vanish due to the projection operator. The other two components will, it turns out (see problem 50.2) be represented by a two-component spinor which commutes.
 - We call this a twistor.
- That's it! The rest is just notation, which will be explored and expanded in the problems.
 - Srednicki also uses an example of a scattering amplitude using this notation; however, this is unhelpful in terms of calculating any physically measurable quantity, so I think this example is rather artificial.