Exercise for Colours and Flavours and their consequences Autumn 2019: lecture 6/7

Chiral Perturbation Theory

Lowest order

- For $m_u = m_d = \hat{m}$ derive the Gell-Mann–Okubo relation $m_\eta^2 = \frac{4}{4} m_K^2 - \frac{1}{3} m_\pi^2$
- Perform the calculations for $\pi\pi$-scattering as done in the lecture explicitly for both cases.
- Work your way through the relation $F_0 = F_\pi$ at lowest order

NLO

Do the steps involved in calculating the corrections to the charged pion mass (take $m_u = m_d = \hat{m}$) but for the charged kaon instead.