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Homework 5

- Consider the non-linear σ model discussed in class with an effective Lagrangian,

$$L = \frac{f^2}{4} Tr \left(\partial_\mu \Sigma \partial^\mu \Sigma^\dagger \right)$$

where $\Sigma = exp(i\vec{\pi} \cdot \vec{\tau}/f)$ and τ are the Pauli matrices. Assume $\pi^\pm = (\pi_1 \mp i\pi_2)/2$ and $\pi_3 = \pi^0$. Compute the tree level cross section for $\pi^+\pi^0 \to \pi^+\pi^0$
- Assume that $f = v = 246\ GeV$ and the non-linear sigma model is an effective Lagrangian for the weak interactions. At what energy scale is perturbative unitarity violated?