Week 6

1. Calculate the decay width of the $f_0(500)$ to two pions (both charged and neutral) in the linear sigma model.

$$\mathcal{L}_{\text{int}} = \frac{1}{f_\pi} S \partial_\mu \vec{\pi} \partial^\mu \vec{\pi} - \frac{m_\pi^2}{2 f_\pi} S \vec{\pi}^2$$

Take $f_\pi = 92$ MeV and $m_\pi = 140$ MeV. Discuss which values of m_{f_0} in the allowed PDG range provide values of the decay width compatible with the range given in the PDG, if any.