

# Exercise for Colours and Flavours and their consequences

## Autumn 2020: lecture 5

### Heavy Quark Effective Theory

- Use the Dirac equation for the free particle to remove the anti-quark degree and do the explicit derivation of the lowest order heavy quark Lagrangian, try to get the term with two derivatives as well.
- Derive from the reparametrization invariance the the coefficient of the term with two derivatives.

### Linear/nonlinear sigma model

Perform the calculations for  $\pi\pi$ -scattering as done in the lecture explicitly for both cases.