

Exercise for Colours and Flavours and their consequences

Autumn 2019: lecture 4

Effective field theory

In the standard model Lagrangian baryon and lepton number are conserved. This is not an imposed symmetry but an accidental one.

- Show that there are no terms of dimension four that are gauge invariant that violate baryon and lepton number, take the standard model as being without right-handed neutrinos and no neutrino masses.
- Show also that the first terms you can construct are dimension six.
- Do all of these dimension six terms conserve $B - L$?
- A more tricky one, could you produce neutrino masses with higher dimension terms in the theory without right-handed neutrinos in a gauge invariant fashion and if yes, what are the dimensions of those terms?