Flavor Physics – Exercise Sheet 1 – SomSem 2015

Discussion: 24/04 during the tutorial

Exercise 1: Massive Neutrinos

Massive neutrinos imply the existence of right-handed (RH) neutrinos ν_R:

- argue, why this is the case;
- give the charges of ν_R under the Standard Model gauge group;
- what are the interactions of the ν_R?

Exercise 2: Mixing of u-type quarks

Somebody ignores the usual convention and would like to have the weak (flavor) eigenstates and the mass eigenstates of the down-type quarks to be the same. What would be the definition of the corresponding u-type quark mixing-matrix?

Exercise 3: CKM-Elements at work

Consider the two decays of the neutral D-Meson: $D^0(c\bar{u}) \to K^-(s\bar{u})\pi^+(u\bar{d})$ (favored) and $D^0(c\bar{u}) \to K^+(u\bar{s})\pi^+(d\bar{u})$ (suppressed). Express the ratio of the branching fractions for the two decays as a function of the CKM matrix elements.