

Lepton flavour violating $\Sigma_b \rightarrow \Sigma l_1 l_2$ decays in Z' model

Thursday, 16 February 2023 19:00 (1h 30m)

Inspired by the various LHCb results of lepton flavour violation on $b \rightarrow s$ transition we will study the lepton flavour violating $\Sigma_b \rightarrow \Sigma l_1 l_2$ decays in terms of transversity amplitudes in non-universal Z' model. These LFV processes are extremely suppressed in the Standard Model (SM) because the expected levels at the SM lie far below current experimental sensitivities. In particular the branching fractions of $B^0 \rightarrow \tau^\pm \mu^\mp$ and $B_s \rightarrow \tau^\pm \mu^\mp$ decays are obtained in SM of order 10^{-54} [1] whereas experimentally they are constrained at the order of 10^{-5} by BaBar and LHCb with 90% and 95% confidence level respectively [2, 3]. There are several theoretical models proposed to explain various popular anomalies of b hadron sector. It can be said that the models that generate LFU violation also can generate LFV processes. Various lepton flavour violating decays, such as $\tau \rightarrow 3\mu$, $\mu \rightarrow 3e$, $l \rightarrow l' M$ (where l, l' are different leptons and M is meson) and radiative decays $\mu \rightarrow e\gamma$ etc are studied in different NP models [4, 5] though there are no direct experimental evidence of these decays but their experimental bounds exist. In this work we will study the differential branching fractions of LFV decays $\Sigma_b \rightarrow \Sigma l_1 l_2$ induced by the quark level transition $b \rightarrow s l_1 l_2$ in Z' model where l_1 and l_2 are charged leptons of different flavours. We will constrain the NP couplings using several experimental upper limits. It is expected that the study of the decay would be very interesting and that might emboss the footprints of NP more aesthetically.

References:

- L. Calibbi and G. Signorelli, Charged lepton flavour violation: An experimental and theoretical introduction, Riv. Nuovo Cim. 41, 71 (2018) [arXiv: 1709.00294 [hep-ph]].
- BaBar collaboration, B. Aubert et al., "Searches for the decays $B^0 \rightarrow l^\pm \tau^m p$ and $B^+ \rightarrow l^+ \nu$ ($l=e,\mu$) using hadronic tag reconstruction", Phys. Rev. D 77, 091104 (2008) [arXiv: 0801.0697 [hep-ex]].
- R. Aaij et al. [LHCb Collaboration], Search for the lepton-flavour-violating decays $B_s^0 \rightarrow \tau^\pm \mu^\mp$ and $B^0 \rightarrow \tau^\pm \mu^\mp$, Phys. Rev. Lett. 123, 211801 (2019) [arXiv: 1905.06614 [hep-ex]].
- S. Sahoo and R. Mohanta, lepton flavour violating B meson decays via scalar leptoquark, Phys. Rev. D 93, 114001 (2016) [arXiv:1512.04657[hep-ph]].
- D. Das, "Lepton flavour violating $\Lambda_b \rightarrow \Lambda l_1 l_2$ decay", Eur. Phys. J. C 79, 1005 (2019), [arXiv: 1909.08676 [hep-ph]].

Primary authors: CHAKRABARTY, RAJESH (NATIONAL INSTITUTE OF TECHNOLOGY DURGAPUR); BISWAS, SWAGATA (NATIONAL INSTITUTE OF TECHNOLOGY DURGAPUR)

Presenter: CHAKRABARTY, RAJESH (NATIONAL INSTITUTE OF TECHNOLOGY DURGAPUR)

Session Classification: Poster Session and Discussion Session