



Contribution ID: 209

Type: **Parallel talks**

Status of $b \rightarrow sll$ global fits post 2022

We discuss the impact of the recent LHCb update on the two lepton-flavour universality ratios R_K and R_{K^*} , and the CMS update of $B(B_s \rightarrow \mu^+ \mu^-)$ regarding the possibility of New Physics in $b \rightarrow s\ell^+ \ell^-$ decays. We perform global fits of the New Physics Wilson coefficients defined in the model-independent approach of the Weak Effective Theory at the b -quark mass. We discuss three different frameworks for this analysis: i) an update limited to the experimental data using the same theoretical framework as in earlier works, ii) a full update concerning both the experimental inputs and the theoretical framework, iii) an analysis without the LHCb results on electron modes. The comparison between these sets of results allows us to identify the differences stemming from the various components of the analysis: new experimental results, new inputs for the hadronic form factors, the role played by LHCb data on electron modes. As expected, the significance of all New Physics hypotheses gets reduced after the LHCb announcements on $R_{K^{(*)}}$ while the hypothesis of a lepton-flavour-universal contribution to the Wilson coefficient of the semileptonic $O_{9\ell}$ operators (possibly with a very small lepton-flavour-universality violating component) is reinforced. We also discuss the possibility of a long-distance charm-loop contribution through a mode-by-mode analysis and we find that the preferred values for the $C_{9\mu}$ Wilson coefficient are consistent throughout the different $b \rightarrow s\mu^+ \mu^-$ modes and that there is no significant evidence of non-constant q^2 dependencies, which would indicate the presence of a long-distance charm-loop contribution beyond those already included.

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Session Classification: Flavour physics: Theory and Experiment

Track Classification: Flavour physics: Theory and Experiment