Contribution ID: **391** Type: **Parallel Talk**

A Monte Carlo event generator for new physics in $\bar{B} \to D^{*+}\ell^-\bar{\nu}_\ell$

Friday, 8 July 2022 17:51 (17 minutes)

We demonstrate a new event generator tool based on EvtGen that allow us to simulate new physics (NP) signatures in $\bar{B} \to D^{*+}\ell^-\bar{\nu}_\ell$ decays. Recent experimental results from Belle, Babar and LHCb have all pointed towards new physics in the weak semileptonic $b \to c$ transitions which urge for an immediate need of advanced analysis techniques which we achieve through this simulator. We have further used our Monte Carlo (MC) tool to study in detail the semileptonic decay with muon and electron in the final state. We have examined the signatures of new physics in the muon mode which are consistent with current data. Angular asymmetries such as A_{FB}, S_3, S_5 and S_7, that can be extracted from the fully reconstructed angular distribution, are found to be highly sensitive to the presence of NP. In order to reduce the dependence on form factor uncertainties, we introduce Δ-observables for the angular asymmetries by taking the difference between the observables for the muon and electron final states. Throughout our analysis we have assumed that the electron mode decay is well described by the SM. Apart from analyzing the Δ observables for three distinct NP scenarios, We have additionally exhibited the prospects of probing such NP couplings with the future 50 ab^{-1} of Belle II data.

In-person participation

Yes

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Session Classification: Quark and Lepton Flavour Physics

Track Classification: Quark and Lepton Flavour Physics