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Probing New Physics through Right-Handed Neutrinos in Semileptonic $\bar{B}$ Decays

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More evidence of New Physics (NP) has been observed in charged current decays of $\bar{B} \to D^* \ell \bar{\nu}$, as measured by the BaBar, Belle, and LHCb experiments. Curiously, the observable R_{D^*} has been found to exceed Standard Model (SM) expectations, with a combined significance of 3.4σ. Moreover, there is further motivation for NP in the muon sector due to persistent anomalies in the muon anomalous magnetic moment ($(g-2)_\mu$) and in neutral current processes such as $b \to s\mu^+\mu^-$.In this work, we investigate the differential decay distributions of $\bar{B} \to D^* \ell \bar{X}$, where X is a heavy right-handed neutrino. To explore NP signatures associated with such a neutrino, we employ a newly developed Monte Carlo event generator built upon the EvtGen framework, tailored specifically to simulate beyond-the-Standard-Model processes.
Our study includes an analysis of angular observables and kinematic distributions, with particular emphasis on forward-backward asymmetries, such as $\Delta A_{\rm FB} = A^{\mu}_{\rm FB} - A^{e}_{\rm FB}$, among others. These observables offer valuable insight into potential deviations from SM predictions and represent a promising avenue for probing the existence of right-handed neutrinos in semileptonic B-meson decays.

Mini Symposia (Invited Talks Only)

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Plenary (Invited talks only)

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