EPS-HEP2023 conference



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Type: Parallel session talk

New Measurement of Lepton-Flavor-Universality Ratios $R(D^{(*)})$ and Study of $B \to D^{**} \ell \bar{\nu}_{\ell}$ from Belle

Wednesday 23 August 2023 09:12 (25 minutes)

We present a new measurement of the lepton-flavor-universality ratios $R(D^{(*)})$ utilizing the entire Belle data set, which corresponds to an integrated luminosity of 711 fb⁻¹. The analysis employs hadronic tagside reconstruction, leveraging the capabilities of the full-event-interpretation algorithm developed for Belle II. This results in a significant efficiency improvement of approximately a factor of two with respect to the previously utilized tag-side reconstruction method. The analysis utilizes the reconstructing the mass squared of missing neutrinos originating from leptonic tau decays ($\tau \rightarrow \ell \bar{\nu}_{\ell} \nu_{\tau}$) and unassigned neutral energies registered in the Belle calorimeter. By exploiting these two observables, we separate $B \rightarrow D^{(*)} \tau \bar{\nu}_{\tau}$ decays from background processes and the normalization mode $B \rightarrow D^{(*)} \ell \bar{\nu}_{\ell}$ with $\ell = e, \mu$ using a two-dimensional fit. One of the key backgrounds of this analysis are decays involving higher charm resonances (D^{**}). Their branching fractions and decay dynamics are poorly known. The talk also covers related measurements from Belle, such as the first observation of the $B \rightarrow D_1 \ell \bar{\nu}_{\ell}$ decay with $D_1 \rightarrow D\pi\pi$ and new measurements of $B \rightarrow D^{(*)} \pi \ell \bar{\nu}_{\ell}$ and $B \rightarrow D^{(*)} \pi \pi \ell \bar{\nu}_{\ell}$ branching fractions. These results provide further insights into the difference between the inclusive $B \rightarrow X_c \ell \bar{\nu}_{\ell}$ branching fraction and the sum over exclusive contributions from D, D^* and D^{**} contributions.

Collaboration / Activity

Belle Collaboration

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