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Title:	Measurement of $R(D)$ and $R(D^*)$ with a Semileptonic Tagging Method
Authors:	Patra, S. (/jspui/browse?type=author&value=Patra%2C+S.)
Keywords:	Experimental Electron Belle detector
Issue Date:	2020
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Citation:	Physical Review Letters, 124(16).
Abstract:	The experimental results on the ratios of branching fractions $R(D) = B(\bar{B} \rightarrow D \tau^- \bar{\nu}_\tau) / B(\bar{B} \rightarrow D \ell^- \bar{\nu}_\ell)$ and $R(D^*) = B(\bar{B} \rightarrow D^* \tau^- \bar{\nu}_\tau) / B(\bar{B} \rightarrow D^* \ell^- \bar{\nu}_\ell)$, where ℓ denotes an electron or a muon, show a long-standing discrepancy with the standard model predictions, and might hint at a violation of lepton flavor universality. We report a new simultaneous measurement of $R(D)$ and $R(D^*)$, based on a data sample containing 772×10^6 $B\bar{B}$ events recorded at the $Y(4S)$ resonance with the Belle detector at the KEKB e^+e^- collider. In this analysis the tag-side B meson is reconstructed in a semileptonic decay mode and the signal-side τ is reconstructed in a purely leptonic decay. The measured values are $R(D) = 0.307 \pm 0.037 \pm 0.016$ and $R(D^*) = 0.283 \pm 0.018 \pm 0.014$, where the first uncertainties are statistical and the second are systematic. These results are in agreement with the standard model predictions within 0.2, 1.1, and 0.8 standard deviations for $R(D)$, $R(D^*)$, and their combination, respectively. This work constitutes the most precise measurements of $R(D)$ and $R(D^*)$ performed to date as well as the first result for $R(D)$ based on a semileptonic tagging method.
Description:	Only IISERM authors are available in the record.
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