Addendum: Test of lepton universality in beauty-quark decays

Addendum to: *Nature Physics* https://doi.org/10.1038/s41567-021-01478-8. Published online 15 March 2022.

https://doi.org/10.1038/s41567-023-02095-3

Published online: 10 August 2023

Check for updates

LHCb collaboration*

In a new analysis since the publication of the original article, the LHCb collaboration performs a simultaneous test of muon-electron universality using $B^+ \to K^+ l^- l^+$ and $B^0 \to K^{*0} l^- l^+$ ($l = e, \mu$) decays with data collected between 2011 and 2018, corresponding to an integrated luminosity of 9 fb^{-1}(ref. 1). Further details are provided in ref. 2. The decay-rate ratios of muon to electron modes, R_K and R_{K^*}, are measured in two q^2 regions, $0.1 < q^2 < 1.1\,GeV^2/c^4$ (low-q^2) and $1.1 < q^2 < 6.0\,GeV^2/c^4$ (central-q^2).

In ref. 1 the value of R_K in the central-q^2 range is measured with the same data sample as in the initial *Nature Physics* publication, but different selection requirements and analysis procedures are used. The value obtained in ref. 1, $R_K(\text{central} - q^2) = 0.949^{+0.042}_{-0.041}(stat)^{+0.022}_{-0.022}(syst)$, differs from the originally published result in *Nature Physics*. The new analysis finds that a component of the shift can be attributed to statistical effects (with a Gaussian distribution width of 0.033, as evaluated through pseudoexperiments). The main differences come from the reduction of misidentified hadronic backgrounds to the electron-decay mode due to a tighter electron particle identification working point (shift of 0.064) and the modelling of the remaining residual contribution (shift of 0.038). The new R_K central-q^2 value is compatible with the Standard Model prediction[1] and supersedes the result originally published. The numerical results initially presented in this paper should not be used as input for any meta analysis.

*A list of authors and their affiliations appears online.

References

1. Aaij, R. et al. (LHCb Collaboration). Test of lepton universality in $b \to s\ell^+\ell^-$ decays. *Phys. Rev. Lett.* **131**, 051803 (2023).
2. Aaij, R. et al. (LHCb Collaboration). Measurement of lepton universality parameters in $B^+ \to K^+\ell^+\ell^-$ and $B^0 \to K^{*0}\ell^+\ell^-$ decays. *Phys. Rev. D* **108**, 032002 (2023).