

Erratum to

LHCb Collaboration; Aaij, R.; Adeva, B.; Adinolfi, M.; Affolder, A.; Ajaltouni, Z.; Akar, S.; Albrecht, J.; Alessio, F.; Alexander, M.; Ali, S.; Alkhazov, G.; Alvarez Cartelle, P.; Alves, A. A.; Amato, S.; Amerio, S.; Amhis, Y.; An, L.; Anderlini, L.; Anderson, J.

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Erratum: Differential branching fraction and angular analysis of $\Lambda_b^0 \rightarrow \Lambda \mu^+ \mu^-$ decays



The LHCb collaboration

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The angular distribution of the dimuon system of the decays $\Lambda_b^0 \rightarrow \Lambda \mu^+ \mu^-$ and $\bar{\Lambda}_b^0 \rightarrow \bar{\Lambda} \mu^+ \mu^-$ can be described by

$$\frac{d\Gamma}{d \cos \theta_\ell} = \frac{3}{8}(1 + \cos^2 \theta_\ell)(1 - f_L) + A_{\text{FB}}^\ell \cos \theta_\ell + \frac{3}{4}f_L \sin^2 \theta_\ell, \quad (1)$$

where A_{FB}^ℓ is the forward-backward asymmetry of the dimuon system and f_L is its longitudinal polarisation fraction. For the Λ_b^0 decay, the angle θ_ℓ is calculated as the angle between the direction of the μ^+ lepton, in the rest frame of the dimuon pair, and the direction of the dimuon pair, in the rest frame of the Λ_b^0 decay. The forward-backward asymmetry of the lepton pair, A_{FB}^ℓ , is “odd” under CP conjugation and changes in sign between the Λ_b^0 and $\bar{\Lambda}_b^0$ decays. To compensate for this sign, the angle θ_ℓ is usually calculated from the μ^- lepton rather than the μ^+ lepton such that A_{FB}^ℓ can be calculated from the combined sample. This was the intended approach of this paper. Unfortunately, A_{FB}^ℓ was determined using the μ^+ lepton when determining θ_ℓ for both the Λ_b^0 and the $\bar{\Lambda}_b^0$ decays. Consequently, the value of A_{FB}^ℓ in this paper corresponds to a difference $A(A_{\text{FB}}^\ell)$ in asymmetries between the Λ_b^0 and $\bar{\Lambda}_b^0$ decays rather than a proper average and is expected to be zero if CP is conserved. The result quoted as A_{FB}^ℓ in this paper should therefore be interpreted as

$$A(A_{\text{FB}}^\ell) = -0.05 \pm 0.09 \text{ (stat)} \pm 0.03 \text{ (syst)}, \quad (2)$$

and is indeed consistent with the Standard Model expectation that CP violating effects should be small in the decay $\Lambda_b^0 \rightarrow \Lambda \mu^+ \mu^-$. This is in itself a useful result. A measurement of A_{FB}^ℓ has since been presented in ref. [1]. The results in ref. [1] supersede the corresponding results in this paper. Note, the mistake in the angular definition only affects the value of A_{FB}^ℓ presented in the paper. The values of f_L , A_{FB}^h and the differential branching fraction are unchanged, due to the symmetry of the efficiency model in $\cos \theta_\ell$.

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