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Planck 2018 results

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VI. Cosmological parameters *(Corrigendum)*

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In the original version, the bounds given in Eqs. (87a) and (87b) on the contribution to the early-time optical depth, $\tau(15, 30)$, contained a numerical error in deriving the 95th percentile from the Monte Carlo samples. The corrected 95% upper bounds are:

$$\tau(15, 30) < 0.018 \quad (\text{lowE, flat } \tau(15, 30), \text{FlexKnot}); \tag{1}$$

$$\tau(15, 30) < 0.023 \quad (\text{lowE, flat knot, FlexKnot}). \tag{2}$$

These bounds are a factor of ∼3 larger than the originally reported results. Consequently, the new bounds do not significantly improve upon previous results from *Planck* data presented in Millea & Bouchet (2018) as was stated, but are instead comparable. Equations (1) and (2) give results that are now similar to those of Heinrich & Hu (2021), who used the same *Planck* 2018 data to derive a 95 % upper bound of 0.020 using the principal component analysis (PCA) model and uniform priors on the PCA mode amplitudes.

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References

Heinrich, C., & Hu, W. 2021, ArXiv e-prints [arXiv:2104.13998]
Millea, M., & Bouchet, F. 2018, A&A, 617, A96

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