Erratum: Baryonic effects on CMB lensing and neutrino mass constraints [Phys. Rev. D **101**, 063534 (2020)]

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The C_ℓ^{KK} curves displayed in Fig. 1 were computed using Eq. (1), with the form of $P_m(k, z)$ given by Eq. (3). Our numerical implementation of this computation contained an error that affected these curves and the other results derived from them. In addition, there was a separate error that only affected the matter power spectra from the IllustrisTNG300 simulation and the associated C_ℓ^{KK} computation.¹

Updated versions of Figs. 1–2 and Tables I–II are shown below. Fixing the errors generally moves the impact of baryonic effects on C_ℓ^{KK} to lower L , but our conclusions are qualitatively unchanged. In particular:

- (i) The $\Delta\chi^2_{\text{bary}}$ values in Table I indicate that baryonic effects from the simulations with stronger feedback from active galactic nuclei (AGN) would be relevant for Stage IV CMB lensing surveys, and all simulations give effects that would be detectable with CMB-HD.
- (ii) Fig. 2 and Table II show that baryonic effects induce a wide range of biases on neutrino mass constraints, in some cases comparable to the statistical uncertainty. In particular, the bias can be as large as $\sim 2\sigma$, in the case of BAHAMAS-HighAGN for a Stage IV experiment with $\sigma(\tau) = 0.002$.

FIG. 1. The effect of baryonic feedback on the CMB lensing power spectrum. The curves show the ratio of the baryonic and the dark matter only (DMO) lensing power, and the colors represent the different baryonic simulations used. All curves experience a suppression of varying degree, depending on the prescription of AGN feedback implemented in the simulations. OWLS-AGN (green dash-dotted line) has a maximum suppression of about 17% compared to its DMO counterpart. Error bars from forecasts of Stage III, Stage IV and CMB-HD experiments are shown in the zoomed-in frames. From $\ell = 500$ to 3000 (left frame), Stage III error bars exceed the effects of baryonic feedback, while Stage IV error bars suggest that the stronger baryonic feedback models will likely be distinguishable from the DMO prediction. In the range accessible to CMB-HD (right frame), the error bars suggest that all baryonic models presented here will be strongly detected.

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TABLE I. $\sqrt{\Delta\chi^2_{\text{bary}}}$ values for each simulation, yielding the effective “signal to noise” for the impact of baryons, summed over all bandpowers.

Simulation	Stage III	Stage IV	CMB-HD
OWLS-AGN	1.2	6.8	95
BAHAMAS	1.0	5.6	65
BAHAMAS-LowAGN	0.60	3.3	43
BAHAMAS-HighAGN	1.8	9.7	91
Horizon-AGN	0.28	1.8	40
IllustrisTNG100	0.16	0.94	22
IllustrisTNG300	0.17	1.0	32

TABLE II. Neutrino mass bias values. Models with stronger baryonic feedback have higher fractional σ_{M_ν} deviation from the fiducial value. See Fig. 2.

Experiment	$\sigma_{\text{prior}}(\tau)$	σ_{M_ν} [meV]	Simulation	ΔM_ν [meV]	$\Delta M_\nu / \sigma_{M_\nu}$
Stage III	0.006	22	OWLS-AGN	6.9	0.31
			BAHAMAS	6.3	0.29
			BAHAMAS-LowAGN	3.6	0.16
			BAHAMAS-HighAGN	12	0.53
			Horizon-AGN	0.84	0.038
			IllustrisTNG100	0.89	0.040
			IllustrisTNG300	0.90	0.041
Stage IV	0.006	20	OWLS-AGN	15	0.75
			BAHAMAS	13	0.64
			BAHAMAS-LowAGN	7.6	0.37
			BAHAMAS-HighAGN	24	1.2
			Horizon-AGN	3.2	0.15
			IllustrisTNG100	2.0	0.096
			IllustrisTNG300	2.1	0.10
Stage IV	0.002	12	OWLS-AGN	14	1.2
			BAHAMAS	12	1.0
			BAHAMAS-LowAGN	7.1	0.58
			BAHAMAS-HighAGN	22	1.8
			Horizon-AGN	2.8	0.23
			IllustrisTNG100	1.9	0.15
			IllustrisTNG300	2.0	0.16

FIG. 2. Neutrino mass bias due to baryonic feedback in large scale clustering, shown as deviations from the fiducial neutrino mass of $M_\nu^{\text{fid}} = 60$ meV. Note that for the inverted hierarchy the minimal mass is twice this, at $M_\nu = 120$ meV. We use two values for the uncertainty on the optical depth to reionization, $\sigma_{\text{prior}}(\tau)$, corresponding to the current constraint of 0.006, and the cosmic-variance-limited constraint of 0.002. For the Stage III experiment, the bias can be as large as 0.5σ for the simulation with the strongest AGN feedback. For Stage IV, the bias is appreciable for many of the simulations, in some cases exceeding 1σ . Numerical values are available in Table II.

We have also updated the publicly-released computations from this paper.²

²https://github.com/sjforeman/cmbensing_baryons.