

Probing small-scale baryon and dark matter isocurvature perturbations with cosmic microwave background anisotropies

([arXiv:2108.07798](#))

- Results Table

Nanoom Lee and Yacine Ali-Haïmoud

1 Dirac-delta spike, $\Delta_{\mathcal{I}}^2(k_0)$

k_0 (Mpc $^{-1}$)	Planck				CMB S-4 (forecast)		
	CI	CIP	BI	BCI	CI	BI/CIP	BCI
1	0.739	0.209	0.167	0.067	0.081	0.055	0.018
1.788	0.700	0.206	0.163	0.064	0.077	0.055	0.017
3.162	0.671	0.207	0.166	0.063	0.075	0.054	0.017
5.623	0.672	0.210	0.164	0.063	0.073	0.054	0.017
10	0.663	0.206	0.166	0.060	0.072	0.054	0.017
17.78	0.611	0.208	0.168	0.061	0.072	0.054	0.017
31.62	0.646	0.207	0.164	0.063	0.072	0.054	0.017
56.23	0.633	0.204	0.167	0.062	0.072	0.054	0.017
100	0.647	0.204	0.170	0.064	0.073	0.054	0.017
177.8	0.653	0.194	0.165	0.064	0.077	0.054	0.018
316.2	0.679	0.180	0.155	0.068	0.091	0.052	0.021
562.3	0.857	0.129	0.122	0.072	0.153	0.044	0.024
1000	.	0.084	0.077	0.053	0.342	0.031	0.019
1778	.	0.059	0.052	0.036	0.437	0.020	0.013
3162	.	0.062	0.055	0.036	0.423	0.018	0.011
5623	.	0.321	0.263	0.130	0.368	0.056	0.028
10000	.	.	.	0.611	0.343	0.404	0.166

Table 1: 95% CL upper limits on (sensitivities to) the amplitude of the four isocurvature modes CI, CIP, BI and BCI, from Planck data (CMB S-4 forecast), as a function of wavenumber, for a Dirac-delta spike. Our treatment only applies to $k \lesssim 10^3$ Mpc $^{-1}$, due to our neglect of Lyman- α and Lyman-continuum transport. The constraints are not given if exceeds unity. See FIG. 6 in the paper.

2 Power-law spectrum, $\Delta_{\mathcal{I}}^2(k_p)$

$n_{\mathcal{I}}$	Planck				CMB S-4 (forecast)		
	CI	CIP	BI	BCI	CI	BI/CIP	BCI
-1	1.47×10^{-3}	4.40×10^{-4}	3.70×10^{-4}	1.39×10^{-4}	1.68×10^{-4}	1.18×10^{-4}	3.77×10^{-5}
0	2.34×10^{-2}	6.88×10^{-3}	5.53×10^{-3}	2.11×10^{-3}	2.50×10^{-3}	1.79×10^{-3}	5.69×10^{-4}
0.6	7.09×10^{-2}	2.16×10^{-2}	1.79×10^{-2}	7.05×10^{-3}	8.27×10^{-3}	5.86×10^{-3}	1.89×10^{-3}
0.8	9.09×10^{-2}	2.66×10^{-2}	2.15×10^{-2}	8.88×10^{-3}	1.04×10^{-2}	7.18×10^{-3}	2.37×10^{-3}
1.0	9.88×10^{-2}	2.65×10^{-2}	2.30×10^{-2}	9.13×10^{-3}	1.17×10^{-2}	7.53×10^{-3}	2.61×10^{-3}
1.2	9.05×10^{-2}	2.22×10^{-2}	1.98×10^{-2}	8.46×10^{-3}	1.14×10^{-2}	6.70×10^{-3}	2.48×10^{-3}
1.4	7.15×10^{-2}	1.70×10^{-2}	1.47×10^{-2}	6.89×10^{-3}	9.86×10^{-3}	5.12×10^{-3}	2.05×10^{-3}
2	2.44×10^{-2}	4.01×10^{-3}	3.65×10^{-3}	2.02×10^{-3}	3.69×10^{-3}	1.32×10^{-3}	6.43×10^{-4}
3	1.59×10^{-3}	2.03×10^{-4}	1.92×10^{-4}	1.19×10^{-4}	3.09×10^{-4}	7.05×10^{-5}	3.98×10^{-5}

Table 2: 95% CL upper limits on (sensitivities to) the amplitude of the four isocurvature modes CI, CIP, BI, and BCI, from Planck data (CMB S-4 forecast), as a function of spectral index $n_{\mathcal{I}}$, for a power law spectrum. See FIG. 7 right panel in the paper.

3 Hubble constant, H_0

In addition to all the results given in the tables above, means and 68% intervals of H_0 from Planck 2018 data (TTTEEE + lowE + lensing) with four isocurvature modes CI, CIP, BI, and BCI are given as text files in https://github.com/nanoomlee/small-scale_baryon_CDM_isocurvature_results.