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Erratum: Non-Gaussian density fluctuations from entropically generated curvature perturbations in ekpyrotic models [Phys. Rev. D 77, 063533 (2008)]

Jean-Luc Lehners and Paul J. Steinhardt

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We report corrections to the paper Phys. Rev. D **77**, 063533 (2008). The predicted range of $f_{\rm NL}$ in the abstract should be revised to $-60 \leq f_{\rm NL} \leq 80$, as explained below. Equation (8), taken from Langlois and Vernizzi, D. Langlois and F. Vernizzi, J. Cosmol. Astropart. Phys. 02 (2007) 017), was corrected by those authors to

$$\dot{\mathcal{R}} = \frac{2H}{\dot{\sigma}}\dot{\theta}\delta s + \frac{H}{\dot{\sigma}^2}\left[-(V_{ss} + 4\dot{\theta}^2)(\delta s^{(1)})^2 + \frac{V_{,\sigma}}{\dot{\sigma}}\delta s \delta \dot{s}\right]. \tag{8}$$

Accordingly, a sequence of our relations change

$$\mathcal{R}_{\rm integrated} = -\frac{1}{4}(\delta s^{(1)}_{\rm end})^2 \tag{10}$$

$$f_{\rm NL}^{\rm integrated} = \frac{5}{12\mathcal{R}_L^2}(\delta s^{(1)}_{\rm end})^2 \tag{11}$$

$$f_{\rm NL}^{\rm reflection} = \frac{5}{3\mathcal{R}_L^2}\int_{\rm ref}\frac{H}{\dot{\sigma}^2}\left[(V_{ss} + 4\dot{\theta}^2)(\delta s^{(1)})^2 - \frac{V_{,\sigma}}{\dot{\sigma}}\delta s \delta \dot{s}\right]. \tag{13}$$

In addition, the sign in Eq. (5) should be reversed, resulting in

$$\tilde{c} = \frac{\sqrt{2}(1-\gamma^2)\epsilon^{1/2}}{4\gamma(-\tau)^{1/\epsilon}}\left(1 - \frac{1}{2\epsilon} - \frac{9d\ln\epsilon}{8d\mathcal{N}}\right), \tag{7}$$

and for empty branes we have $\tilde{c} \approx -\sqrt{\epsilon/6} \approx -c_1/4$.

Taking account of all corrections, Fig. 2, a plot of the predicted $f_{\rm NL}$ for a range of models and for a range of durations of the reflection, should be replaced with Fig. 1 below. In making the new figure, we have parametrized the potential

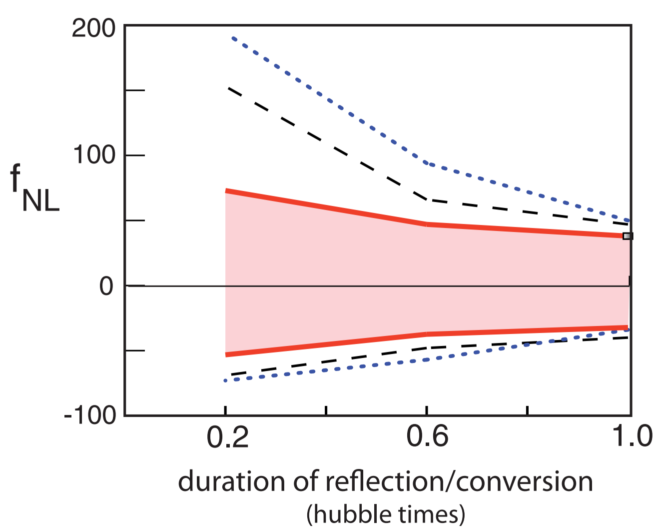

FIG. 1 (color online). The predicted value of the non-Gaussianity parameter $f_{\rm NL}$ as a function of the duration of the reflection. The shaded range represents results for the simplest ekpyrotic and reflection potentials allowing κ_3 to range from $+5$ (top) to -5 (bottom). The upper and lower boundaries can be extended (dashed and dotted curves) by carefully tuning the reflection potentials, but the change is not significant for typical durations $\mathcal{O}(1)$.

describing the ekpyrotic phase by expanding the effective potential in the adiabatic (σ) and entropic (s) directions,

$$V_{\rm ek} = -V_0 e^{\sqrt{2\epsilon}\sigma}\left[1 + \epsilon s^2 + \frac{\kappa_3}{3!}\epsilon^{3/2}s^3 + \cdots\right],$$

where model-dependence is now represented by $|\kappa_3| \sim \mathcal{O}(1)$ (see also Buchbinder *et al.*, Phys. Rev. Lett. **100**, 171302 (2008)). A more precise expression for $\tilde{c}$ is then $\tilde{c} = \kappa_3\sqrt{\epsilon}/8$. The central shaded region represents the typical range for $f_{\rm NL}$ assuming a simple potential for modeling the reflection of ϕ_2 and varying its parameters and varying $|\kappa_3| \leq 5$. As before, by tweaking the reflection potentials to try to broaden the range, the upper and lower boundaries can be expanded to the dashed or dotted lines, but it is difficult to push further without elaborate tuning. Qualitatively the results agree with the original paper except that the typical range of $f_{\rm NL}$ is reduced,

$$-60 \leq f_{\rm NL} \leq 80 \tag{14}$$

and the sensitivity to the potentials is less.

We note that analytic estimates confirm these results (as shown in Lehners and Steinhardt, Phys. Rev. D **78**, 023506 (2008)). Our main conclusions remain unchanged. We would like to thank F. Vernizzi for communicating us the correction to Eq. (8) above, S. Renaux-Petel for spotting the sign error in Eq. (5) and K. Koyama for useful discussions.