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Local Scale-Dependent Non-Gaussian Curvature Perturbations at Cubic Order

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(Submitted on 27 Jul 2011 (v1), last revised 18 Oct 2011 (this version, v4))

We calculate non-Gaussianities in the bispectrum and trispectrum arising from the cubic term in the local expansion of the scalar curvature perturbation. We compute to three-loop order and for general momenta. A procedure for evaluating the leading behavior of the resulting loop-integrals is developed and discussed. Finally, we survey unique non-linear signals which could arise from the cubic term in the squeezed limit. In particular, it is shown that loop corrections can cause $f_{NL}^{sq.}$ to change sign as the momentum scale is varied. There also exists a momentum limit where $\lambda_{L} < 0\$ can be realized.

Comments:Published in JCAPSubjects:Cosmology and Extragalactic Astrophysics (astro-
ph.CO); High Energy Physics - Phenomenology (hep-ph);
High Energy Physics - Theory (hep-th)Journal reference:JCAP {\bf 1109}, 036 (2011)Cite as:arXiv:1107.5362 [astro-ph.CO]
(or arXiv:1107.5362v4 [astro-ph.CO] for this version)

Submission history

From: Joseph Bramante [view email]
[v1] Wed, 27 Jul 2011 00:58:57 GMT (280kb,D)
[v2] Wed, 3 Aug 2011 05:47:33 GMT (280kb,D)
[v3] Tue, 4 Oct 2011 01:50:42 GMT (253kb,D)
[v4] Tue, 18 Oct 2011 22:11:54 GMT (253kb,D)

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