Non-gaussianities and the Stimulated creation of quanta in the inflationary universe

Ivan Agullo, Leonard Parker

(Submitted on 27 Oct 2010)

Cosmological inflation generates a spectrum of density perturbations that can seed the cosmic structures we observe today. These perturbations are usually computed as the result of the gravitationally-induced spontaneous creation of perturbations from an initial vacuum state. In this paper, we compute the perturbations arising from gravitationally-induced stimulated creation when perturbations are already present in the initial state. The effect of these initial perturbations is not diluted by inflation and survives to its end, and beyond. We consider a generic statistical density operator ρ describing an initial mixed state that includes probabilities for nonzero numbers of scalar perturbations to be present at early times during inflation. We analyze the primordial bispectrum for general configurations of the three different momentum vectors in its arguments. We find that the initial presence of quanta can significantly enhance non-gaussianities in the so-called squeezed limit. Our results show that an observation of non-gaussianities in the squeezed limit can occur for single-field inflation when the state in the very early inflationary universe is not the vacuum, but instead contains early-time perturbations. Valuable information about the initial state can then be obtained from observations of those non-gaussianities.

Comments:	25 pages
Subjects:	**Cosmology and Extragalactic Astrophysics (astro-ph.CO)**; General Relativity and Quantum Cosmology (gr-qc); High Energy Physics - Phenomenology (hep-ph); High Energy Physics - Theory (hep-th)
Cite as:	**arXiv:1010.5766v1 [astro-ph.CO]**

Submission history

From: Ivan Agullo [view email]
[v1] Wed, 27 Oct 2010 19:08:39 GMT (24kb)