

Non-Gaussianity from explicit $U(1)$ -breaking interactions

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We investigate primordial non-Gaussianity (NG) that arises from explicit $U(1)$ symmetry-breaking interactions during inflation, focusing on a nearly massless axial component of a complex scalar field P . We compute the resulting NG parameter f_{NL} , allowing the axial field to act as either a curvaton or cold dark matter (CDM). We consider two scenarios in which the interaction emerges from an explicit $U(1)$ symmetry-breaking potential and from explicit $U(1)$ symmetry-breaking kinetic mixing. We also explore the role of a heavy radial field in generating oscillating correlation signals, noting that such signals can dominate the shape of the mixed adiabatic-isocurvature bispectrum. In certain cases, an oscillatory isocurvature bispectrum signal may be observable in the future, aiding in distinguishing between certain types of the $U(1)$ -breaking self-interactions of the axial field.

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