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Non-gaussian imprints of primordial magnetic fields from inflation

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If cosmic magnetic fields are produced during inflation, they are likely to be correlated with the primordial curvature perturbations that are responsible for the Cosmic Microwave Background anisotropies and Large Scale Structure. We compute the three-point cross-correlation function of the curvature perturbation with two powers of the electromagnetic field in a typical model of inflationary magnetogenesis. Such a correlation turns out to be non-Gaussian in nature and serves as a new contribution to the non-Gaussian signatures induced by primordial magnetic fields. We show that there exists a new simple consistency relation for such a cross-correlation in the squeezed limit. On the other hand, the signal is maximized for the flattened configuration where the magnetic non-linear parameter becomes as large as $O(10^3)$. Detectability of such a correlation can both provide a new observational window to the underlying theory of cosmic inflation, and also shed light on the origin of cosmic magnetic fields.

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