TESTING PRIMORDIAL NON-GAUSSIANITY ESTIMATORS IN NON-TRIVIAL COSMIC TOPOLOGIES

Primordial non-Gaussianity

↓

constrained through the non-linearity parameter f_{NL} using KSW estimator

↓

assumes statistical isotropy

Non-trivial cosmic topologies

↓

break isotropy and induces off-diagonal harmonic correlations

↓

potentially affecting the behaviour of standard isotropic estimators

Goal of the project: investigate how robust standard isotropic estimators remain when applied to CMB maps generated in topological universes.

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Step 1 — Validation of the KSW estimator on standard Gaussian and non-Gaussian ΛCDM simulations

Step 2 — Application to topological CMB realizations: CMBtopology code used to generate Gaussian CMB realizations for the E1 and E3 topologies and analyzed them using the standard isotropic KSW estimator.

Any non-zero reconstructed f_{NL} would indicate an effective response of the isotropic estimator to topology-induced anisotropies rather than genuine primordial non-Gaussianity.

What happens when an estimator designed for an isotropic Universe is applied to a Universe that is not statistically isotropic?