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Bayesian Cosmological inference beyond statistical isotropy

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With advent of rich data sets, computationally challenge of inference in cosmology has relied on stochastic sampling method. First, I review the widely used MCMC approach used to infer cosmological parameters and present a adaptive improved implementation SCoPE developed by our group. Next, I present a general method for Bayesian inference of the underlying covariance structure of random fields on a sphere. We employ the Bipolar Spherical Harmonic (BipoSH) representation of general covariance structure on the sphere. We illustrate the efficacy of the method with a principled approach to assess violation of statistical isotropy (SI) in the sky maps of Cosmic Microwave Background (CMB) fluctuations. The general, principled, approach to a Bayesian inference of the covariance structure in a random field on a sphere presented here has huge potential for application to other many aspects of cosmology and astronomy, as well as, more distant areas of research like geosciences and climate modelling.

References:

5.Santanu Das, Benjamin Wandelt & TarunSouradeep, *Journal. Of Cosmology and Astroparticle Physics,* **1510**, 050 (2015).

1. Santanu Das, & Tarun Souradeep, *Journal. Of Cosmology and Astroparticle Physics,* **1407**, 018 (2015).