

Primordial Chiral Gravitational Waves from the Axiverse

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It is known that, the “axion”, the pseudo NG boson of a broken chiral symmetry, is a favorable candidate for an inflaton; it preserves an inflaton’s potential against quantum loop corrections due to its shift symmetry. The presence of axions in the early universe is strongly suggested by string theory. On the contrary, string theory suggests the presence of a plenitude of axions through a compactification in an extra-dimensional complex manifold. It is expected that these many axions with a wide mass range affect various cosmological phenomena, just like an inflationary universe. Under such a description, dubbed “axiverse”, we study the possibility of realizing an axionic inflation consistent with the observation of CMB polarization.

We focus on the property of primordial gravitational waves derived from such an axionic inflation. String axions generally couple to Chern-Simons terms of gauge fields due to the anomaly cancellation, and remarkably, this interaction sources the tensor components of metric perturbations and can enhance one helicity mode of gravitational waves, producing primordial chiral gravitational waves. In this talk, we verify the possibility of detecting such an interesting signal from the axiverse in future experiments, without contradicting CMB observations. This presentation is based on the following our work (arXiv:1412.7620 [hep-ph]).

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