

# APCTP LECTURE

## Topological Gravity as the Early Phase of Our Universe

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**#512, APCTP HQ & ZOOM**

### Abstract

Motivated by string dualities we propose topological gravity as the early phase of our universe. The topological nature of this phase naturally leads to the explanation of many of the puzzles of early universe cosmology. A concrete realization of this scenario using Witten's four dimensional topological gravity is considered. This model leads to the power spectrum of CMB fluctuations which is controlled by the conformal anomaly coefficients  $a, c$ . In particular the strength of the fluctuation is controlled by  $1/a$  and its tilt by  $cg^2$  where  $g$  is the coupling constant of topological gravity. The positivity of  $c, a$  consequence of unitarity, leads automatically to an IR tilt for the power spectrum. In contrast with standard inflationary models, this scenario predicts  $O(1)$  non-Gaussianities for four-and higher-point correlators and the absence of tensor modes in the CMB fluctuations.

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