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New inflationary probes of axion dark matter

Tuesday 7 November 2023 15:00 (1h 20m)

The QCD axion, serving as a classical dark matter candidate, has a close intriguing interplay with cosmic inflation, a leading paradigm to understand the origin of our universe. In this talk, I will discuss two novel effects of interaction between the inflaton and the Peccei-Quinn (PQ) scalar field (the phase becomes the axion after symmetry breaking). First, the inclusion of the leading high-dimensional operator between the two fields could modify the conventional boundary between inflationary and post-inflationary axions drastically. In particular, a new window could be opened up for the post-inflationary axion, which does not suffer from the axion isocurvature problem. Second, in the feasible inflationary axion scenario, these operators could lead to a whole new suite of cosmological observables for axion isocurvature. They include correlated clock signals in the curvature and isocurvature spectra, and mixed cosmological-collider non-Gaussianities involving both curvature and isocurvature fluctuations with shapes and running unconstrained by the current data.

Presenter: FAN, JiJI (Brown University)