

**iTHEMS Cosmology Forum
n°1 - Cosmic birefringence and
Parity Violation in the
universe**

Report of Contributions

Contribution ID: 1

Type: **not specified**

Opening remarks and coffee

Contribution ID: 2

Type: **not specified**

Cosmic birefringence tomography - Keynote Talk

Tuesday, 14 May 2024 13:00 (1h 30m)

Cosmic birefringence — a rotation of the linear polarization plane of the cosmic microwave background (CMB) as they travel through space — is a key observational effect on CMB as it provides a way to search for parity-violating physics in cosmology. Recent measurements of the cross-correlation between the even-parity E-modes and odd-parity B-modes in the Planck polarization map suggest a tantalizing hint of cosmic birefringence. A possible candidate for the origin of cosmic birefringence is pseudoscalar “axionlike” fields. In this talk, after briefly reviewing the observations of isotropic and anisotropic cosmic birefringence, I will discuss the importance of the time evolution of axionlike fields to explore the origin of cosmic birefringence.

Presenter: NAMIKAWA, Toshiya (IPMU)

Contribution ID: 3

Type: **not specified**

Tests for primordial parity symmetry - Observation Talk

Tuesday, 14 May 2024 10:30 (1 hour)

Recent measurements of the CMB EB correlation and the imaginary galaxy trispectrum imply some parity-violating signals. These may originate from not only late-time axion phenomenology but also primordial one. Here, I would focus on the latter possibility, and talk about new findings and constraints on inflationary axion models from the above measurements, after reviewing primordial parity violation search so far.

Presenter: SHIRAISHI, Maresuke

Contribution ID: 4

Type: **not specified**

Isotropic and anisotropic cosmic birefringence by axion domain walls - Theory Talk

Tuesday, 14 May 2024 15:30 (1 hour)

The isotropic cosmic birefringence with a rotation angle of about 0.3 degrees has been suggested by the recent analysis of the CMB polarization data. The suggested rotation angle is tantalizingly close to the angle determined by the fine structure constant, $1/137$ radians = 0.42 degrees. I will show that axion domain walls coupled to QED can naturally explain this coincidence for a wide range of axion masses and axion-photon couplings. Furthermore, the axion domain walls predict a characteristic anisotropic cosmic birefringence, which can be investigated by future observations and will tell us about the initial state of the axion fluctuations in the very early universe.

Presenter: TAKAHASHI, Fuminobu