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Cosmology with higher-order statistics of cosmic microwave background polarization

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One of the promising cosmological probes in the next decades is the cosmic microwave background (CMB) polarization. While CMB temperature anisotropies have been already measured very precisely, CMB polarization, in particular, a twisting pattern in the polarization map (B mode) is not well measured. The detection of B mode at more than degree angular scale opens new window into the inflationary universe. Measurement of polarization angle rotation of CMB photons provide hints on high energy physics beyond the standard model. Precise polarization data also enables us to measure gravitational lensing of CMB which is a key probe to understand the properties of neutrinos, dark matter and dark energy. In this talk, the author will present results of the gravitational lensing and polarization rotation measurements using high quality CMB polarization data taken from BICEP2/Keck array experiments. Then the author will give some implications for cosmology and particle physics and discuss future prospects of constraining fundamental physics using CMB polarization measurements. The author will also talk about synergy between CMB experiments and galaxy surveys such as the galaxy-lensing cross correlation with Subaru-Hyper Suprime Cam and CMB experiments and removal of lensing B mode with mass tracers to detect inflationary gravitational waves.

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