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Neutrino mass measurement in a CMB experiment

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Since the first detection of Cosmic Microwave Background (CMB) in 1964,
the observations of CMB have been playing a big role to understand the history of the Universe and to establish the standard model of cosmology. The next frontier of the CMB cosmology is the polarization of CMB. In recent years, CMB experiments have been targetting to measure the polarization component of the CMB, in particular, for detecting curl-like (odd-parity) pattern called B-mode since the discovery of the degree-scale CMB B-mode polarization can be a decisive evidence for the primordial gravitational waves and the cosmic inflation. Another interesting science with the CMB polarization measurement is to measure the mass scale of neutrinos. The sub-degree scale CMB B-mode signal is expected to be generated by gravitational lensing effects from the cosmological large-scale structures. Due to the neutrino mass scale dependence of the large-scale structure evolution, it is possible to extract the neutrino mass information cosmologically with CMB polarization data. In this talk, I will talk on the current status of the CMB polarization experiments and their cosmological implications to the neutrino mass measurements. As an example of CMB experiments, I will focus on the POLARBEAR experiment. POLARBEAR is a ground-based CMB polarization experiment which started science observations in 2012 from the Atacama desert in Chile and is one of the CMB experiments that have detected the CMB B-mode signal originating from gravitational lensing effects. The achievements and prospects of the POLARBEAR experiment and its upgrade project called Simons Array will also be presented in this talk.

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