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Probing Particle Physics Frontiers with CMB S4: Unveiling Cosmic Secrets

The Cosmic Microwave Background Stage 4 (CMB-S4) experiment represents the next leap forward in the cosmology of the early universe, promising unprecedented precision in our understanding of the universe's fundamental properties. This talk will explore the anticipated improvements in the particle physics frontier, focusing on its potential to address some of the most pressing questions in cosmology and particle physics. Key objectives of CMB-S4 include the precise measurement of primordial gravitational waves through the detection of CMB B-modes, which can provide insights into the physics of inflation and the early universe; the mapping of the matter distribution of the universe through CMB lensing measurements, enhancing our understanding of dark matter and dark energy; and the detailed characterization of cosmic neutrinos, offering constraints on neutrino mass and mass hierarchy, energy density, and possible neutrino self-interactions. Additionally, CMB-S4 aims to explore new physics beyond the Standard Model, such as the existence of extra light relics. By improving the sensitivity and resolution of CMB observations, CMB-S4 will play a crucial role in testing and refining our cosmological models, potentially uncovering new phenomena that could revolutionize our understanding of the cosmos.

Track type

CMBR

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