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The New Standard Cosmology

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Cosmology now has a standard model. A relatively simple cosmological model describes the large-scale distribution of galaxies, detailed observations of the microwave background, observations of supernovae, and the abundances of light elements as well as a host of astronomical observations. In this model, the universe is spatially flat, homogeneous and isotropic on large scales. It is composed of ordinary matter, radiation, and dark matter and has a cosmological constant. The primordial fluctuations in this model are nearly scale-invariant Gaussian random fluctuations. I will highlight the key tests of the model and focus on the new results from the Wilkinson Microwave Anisotropy Probe. While this simple model has many successes, many key cosmological questions remain unanswered: what happened during the first moments of the big bang? What is the dark energy? What were the properties of the first stars? I will discuss the role of on-going and future CMB observations in addressing these key cosmological questions and describe how the combination of large-scale structure, supernova and CMB data can be used to address these questions.