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The Next Generation Cosmic Microwave Background Experiment, CMB-S4 (15' + 5')

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Increasingly sensitive and precise measurements of the cosmic microwave background (CMB) have led to spectacular advances in our understanding of the origin, make up and evolution of our universe. We now have a standard cosmological model, Λ CDM, that fits all the cosmological data with only six parameters, although there are some tensions that may hint at cracks in the model. Far from being the last word in cosmology, the model points to exciting times ahead using the ultra-sensitive CMB temperature and polarization measurements to explore new physics, i.e., inflation, dark energy, neutrino masses and possible additional relativistic species.

This talk will discuss the scientific goals and status of the community-driven next generation and P5 endorsed stage 4 ground-based cosmic microwave background program, CMB-S4. By deploying of order 500,000 detectors with multiple frequency bands and using telescopes at the South Pole, the high Atacama plateau in Chile, and possibly at an additional northern site, CMB-S4 will provide the leap in sensitivity to achieve the key cosmological goals of 1) detecting or ruling out large field inflationary models, 2) determining the effective number and masses of the neutrinos, and 3) providing precision constraints on dark energy through its impact on structure formation.

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