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The Future US Cosmology Program

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There is now a standard cosmological theory that is consistent with all extant data, including for the first time cosmological measurements of very high accuracy. The "concordance model," however, contains three elements with weak theoretical motivation and no laboratory verification: a dark matter particle, a non-zero cosmological constant, and a field to drive inflation. Where do we go from here? I will describe observational opportunities that exist in several areas: (1) Testing General Relativity on large scales, where it underlies the concordance model; (2) Detecting signals that originate during cosmological epochs that are presently unobserved: gravity waves from the early Universe, and 21-cm signals from redshifts 6–50; (3) High-precision measures of the expansion and matter-clustering history of the Universe, to gain further information on the "dark" phenomena; (4) More detailed understanding of the paradigm that galaxies form by collapse of baryons into dark-matter potential wells. I will describe US facilities proposed to exploit these observational opportunities.