

The Simons Observatory and CMB-Stage IV

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The Simons Observatory (SO) will make precision temperature and polarization measurements of the cosmic microwave background (CMB) over angular scales between 1 arcminute and tens of degrees using over 40,000 detectors and sampling frequencies between 27 and 270 GHz. SO will consist of a six-meter-aperture telescope coupled to over 20,000 detectors and an array of half-meter aperture refractive cameras, coupled to an additional 20,000 detectors. The unique combination of large and small apertures in a single CMB observatory will allow us to sample a wide range of angular scales over a common survey area while providing an important stepping stone towards the realization of CMB-Stage IV. CMB-Stage IV is a proposed project that will combine and expand on existing facilities in Chile and Antarctica to reach the $\sim 500,000$ detectors required for the project's science objectives. SO and CMB-Stage IV will measure fundamental cosmological parameters of our universe, find high-redshift clusters via the Sunyaev-Zeldovich effect, constrain properties of neutrinos, and seek signatures of dark matter through gravitational lensing. The complex set of technical and science requirements for these experiments has led to innovative instrumentation solutions which we will discuss. For instance, the SO large aperture telescope will couple to a cryogenic receiver that is 2.4 m in diameter and over 2 m long, creating a number of technical challenges. We will give an overview of the drivers for, and designs of, the SO telescopes and cameras as well as the current status of the project. We will also discuss the current status of CMB-Stage IV and important next steps in the project's development.

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