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Cosmology from CMB Polarization with POLARBEAR and the Simons Array

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POLARBEAR is a cosmic microwave background (CMB) polarization experiment located in the Atacama desert in Chile. The science goals of the POLARBEAR project are to do a deep search for CMB B-mode polarization created by inflationary gravitational waves, as well as characterize the CMB B-mode signal from gravitational lensing.

Gravitational lensing of large-scale structure creates B-mode polarization on arcminute scales, and surveys of this signal can be used to constrain the sum of the neutrino masses.

POLARBEAR-1 started observations in 2012, and the POLARBEAR team has published a series of results from its first season of observations, including the first measurement of a non-zero B-mode polarization angular power spectrum. Recently, we released an improved measurement of the B-mode polarization power spectrum, reducing our uncertainties by a factor of two, by adding new data from our second observing season and re-analyzing the combined data set.

To further improve on these measurements, POLARBEAR is expanding to include an additional two telescopes with dichroic receivers covering 95, 150, 220, and 270 GHz, known as POLARBEAR-2/Simons Array. With high sensitivity and large sky coverage, the Simons Array will create a detailed survey of B-mode polarization, and its spectral information will be used to extract the CMB signal from astrophysical foregrounds. We will present the latest POLARBEAR results, as well as the status of development of the Simons Array and its expected capabilities.

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