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CCAT-prime: Cosmology with A Six-meter Submillimeter Telescope at Cerro Chajnantor

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CCAT-prime is a new 6 m crossed Dragone telescope designed to characterize the Cosmic Microwave Background (CMB) polarization and foregrounds, measure the Sunyaev-Zel'dovich effects of galaxy clusters, map the [CII] emission intensity from the Epoch of Reionization (EoR), and probe star formation and the dynamics of the interstellar medium in Milky Way and nearby galaxies. CCAT-prime will make observations from a 5,600 m altitude site on Cerro Chajnantor in the Atacama Desert of northern Chile. The novel optical design of the telescope combined with a high surface accuracy (<10 micron) and the exceptional atmospheric conditions of the site will enable sensitive broadband, polarimetric, and spectroscopic surveys at sub-mm to mm wavelengths. Prime-Cam, the first light instrument for CCAT-prime, consists of a 1.8 m diameter cryostat that can house seven individual instrument modules. Each instrument module, optimized for a specific science goal, will use the state-of-the-art multichroic transition edge sensor (TES) or kinetic inductance detector (KID) arrays operated at 100 mK, and Fabry-Perot interferometers (FPI) for the EoR science. Prime-Cam will be commissioned with staged deployments to populate the seven instrument modules. The full instrument will consist of 24,000 polarimetric TES bolometers at a combination of 220/270/350/410 GHz, 12,000 TES bolometers at 250/350 GHz coupled with FPIs, and 18,000 polarimetric KIDs at 860 GHz. Prime-Cam is currently being developed, and the CCAT-prime telescope is designed and under construction by Vertex Antennentechnik GmbH to achieve first light in 2021. CCAT-prime is also a potential telescope platform for the future CMB Stage-IV observations.

Less than 5 years of experience since completion of Ph.D

Y

Student (Ph.D., M.Sc. or B.Sc.)

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