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# Characterization of the Optical System of the LSPE-STRIP Instrument

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We present the analysis of the optical system of the STRIP instrument, the ground-based telescope of the Large Scale Polarization (LSPE) experiment, which aims at polarization measurements of the Cosmic Microwave Background on large angular scales.
STRIP will observe the polarized emission from the "Observatorio del Teide" in Tenerife, starting in late 2021. The instrument consists of an array of forty-nine coherent polarimeters at 43 GHz (Q-band), coupled to a 1.5 m fully rotating crossed-Dragone telescope. An additional frequency channel with six-elements at 95 GHz (W-band) will be exploited as an atmospheric monitor.
We modelled and characterized the STRIP optics by means of electromagnetic simulations. The model includes the two nominal reflectors, forty-nine Q-band feedhorns, six W-band feedhorns, and the shielding structures. We present the results of the optical simulations of both main beam and sidelobes, including the effects of the infrared filters and the dielectric window of the cryostat. An analysis of the mirrors imperfections and deformations completes our understanding of the LSPE-STRIP optical response in its "real" configuration.
Accurate predictions of radiation patterns are essential both during the instrument development phase and for the extraction of robust data from the simulation pipeline because non-idealities in the optical system may introduce limitations in achieving high precision measurements, if not well understood and controlled. For these reasons, we used our results to simulate STRIP observations with its nominal scanning strategy.

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