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Horn-coupled LEKID arrays for balloon-borne measurements of the CMB

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We are developing Horn-coupled Lumped Element Kinetic Inductance Detector Arrays close to the photon noise limit in the stratospheric environment for multi band Cosmic Microwave Background (CMB) balloon-borne experiments. For this reason, we are focused on four spectral bands: two bands at 150 and 200 GHz, able to characterize the CMB emission; and two bands at 350 and 480 GHz, able to characterize foreground emissions from residual atmosphere and interstellar dust. Our arrays have been designed to be sensitive to both polarizations of the incident radiation, and to operate in Background Limited Infrared Photodetection (BLIP) conditions with background power ranging from 3 to 60 pW (depending on the optical band of interest), making it possible to use them in the typical observing conditions at balloon-borne altitude. Multi-band focal planes with a large aperture telescope as OLIMPO, equipped with a Fourier Transform Spectrometer, for the study of the Sunyaev-Zeldovich effect in galaxy clusters, would be a natural implementation of this technology. We describe here the design and the electrical and optical simulations of these LEKID arrays and the status of their tests.

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