The OLIMPO Experiment

The OLIMPO experiment is a balloon borne millimetric wavelengths telescope, built to measure the Sunyaev-Zel’dovich effect (SZ) in clusters of galaxies during a long duration flight. The measurements are carried out, during the approximate two weeks flight in the stratosphere in four frequency bands centered respectively at 150, 220, 350 and 480GHz, coupled to the 2.6 meters Cassegrain telescope with a resolution respectively of 4.2, 2.9, 1.8 and 1.8. In order to better disentangle the extragalactic contaminating foregrounds, we add to photometric measurements planned also the spectroscopic ability, which is achieved by means of a differential Fourier transform spectrometer. The experiment is ready to be flown from Svalbard islands in a circumpolar summer season long duration flight at about 40km of altitude. Here we describe the instrument, focusing on the low frequency detection chain.

Science

OLIMPO will produce an SZ spectroscopic survey of about 40 clusters and high resolution maps of CMB anisotropy in selected areas, to measure the damping tail of the power spectrum of CMB anisotropy at multipole up to l ~ 4000. High galactic latitude sky regions feature mainly primary anisotropy (CMB), SZ in clusters of galaxies, and the far infrared background from distant galaxies (CIB) and unresolved AGN. These measurements will complement at higher frequency and similar resolution the measurements carried out by ground based telescopes at 150 GHz, thus investigating better the nature of the detected anisotropy at small angular scales. Above 200 GHz, cirrus clouds in the interstellar medium are present even in the cleanest parts of the sky at high galactic latitudes. The bands of OLIMPO were optimized for optimal separation of the different components, and the Differential Fourier Transform Spectrometer (DFTS) allows us to extract efficiently the SZ and CMB anisotropy from contaminating foregrounds.

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