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Balloon-borne experiments for Cosmic Microwave Background studies

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Stratospheric balloon experiments play a unique role in current Cosmic Microwave Background (CMB) studies. CMB research has entered a precision phase, harvesting the detailed properties of its anisotropy, polarization and spectrum, at incredible precision levels. These measurements, however, require careful monitoring and subtraction of local backgrounds, produced by the earth atmosphere and the interstellar medium. High frequencies (larger than 180 GHz) are crucial for the measurements of interstellar dust contamination, but are degraded by atmospheric emission and its fluctuations, even in the best (cold and dry) sites on earth. For this reason, new balloon-borne missions, exploiting long-duration and ultra-long duration stratospheric flights, are being developed in several laboratories worldwide. These experiments have the double purpose of qualifying instrumentation and validating methods to be used on satellite missions, and produce at a relatively fast pace CMB science synergic to ground based CMB observatories. After a general discussion, I'll focus on the OLIMPO experiment (<http://olimpo.roma1.infn.it>), recently flown in a long duration flight in the Arctic, as a demonstrator of the power of these missions.

Summary

We focus on the key role of balloon-borne experiments in high-frequency measurements of the Cosmic Microwave Background anisotropy, polarization, and spectrum.

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