

The primordial B-modes search in the CMB polarization with LSPE/SWIPE

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Measurements of the cosmic microwave background (CMB) polarization represent the best technique to study physical phenomena happening a split-second within the big bang and to test the standard cosmological model. In this scenario, the Large-Scale Polarization Explorer (LSPE) aims at the measurement of polarization at the largest angular scales, where cosmic inflation left its imprint in the form of a curly pattern (B-modes) of linear polarization.

The LSPE is a coordinated ground-based and balloon-borne experiment. The balloon-borne instrument of LSPE, named SWIPE (Short Wavelength Instrument on the Polarization Explorer), is in an advanced phase of development, aiming at a long-duration polar-night flight for a two-weeks-long observation, in the Arctic region. This allows SWIPE to reach a sensitivity in terms of tensor to scalar ratio $r = 0.01$, roughly 10 times better than current upper limits.

SWIPE will observe 25% of sky in 3 frequency bands (90 GHz, 220 GHz and 240 GHz) by means of an array of 330 multi-mode TES bolometers, cooled at 0.3 K, collecting a total of 8800 modes of the CMB. The detectors are fed by a 500 mm aperture cryogenic Stokes polarimeter/telescope, with a continuously rotating polarization modulator as the first optical element. The half-wave plate (HWP) is cooled at 4 K to reduce the radiative loading on the detectors, and spins at 120 rpm, thanks to a superconducting magnetic bearing with a very low friction electromagnetic motor.

In this contribution we describe the SWIPE instrument, its development, and present a forecast performance study. See <http://planck.roma1.infn.it/lspe> for further information.

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