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CMB spectral distortions from Antarctica with COSMO: performance forecast

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COSMO (COSmic Monopole Observer) is a ground based differential Fourier transform spectrometer, to be operated at Dome-C, Antarctica, which aims at measuring the isotropic y -distortion of the Cosmic Microwave Background (CMB).

The current upper-limit on y is dated back to 1990 by COBE-FIRAS to $|y| < 1.5 \cdot 10^{-5}$.

COSMO will measure the absolute brightness of the sky in the 120-280GHz range in comparison with a reference blackbody calibrator and will monitor and remove the atmospheric emission, with its fluctuations, by performing extremely fast sky dips while scanning the interferogram.

We assess the performance of the instrument via ILC-based simulations: input multi-frequency maps, deprived of the atmospheric contribution after the procedure, include CMB anisotropy, thermal dust as the main Galactic foreground, and the isotropic y -distortion as $y = 1.77 \cdot 10^{-6}$. The ILC machinery returns the Comptonization parameter as $y = (1.82 \pm 0.31) \cdot 10^{-6}$ when a noise realization, limited by the photon noise from the atmosphere and the cryostat window emission, is included.

Primary author: Dr MELE, Lorenzo (Sapienza University of Rome)

Co-authors: BATTISTELLI, Elia Stefano (Sapienza, University of Rome); DE BERNARDIS, Paolo (Dipartimento di Fisica, Sapienza Università di Roma); Prof. BERSANELLI, Marco (Università degli studi di Milano); Dr COLUMBRO, Fabio (Sapienza University of Rome); Dr COPPI, Gabriele (Università di Milano Bicocca); Dr COPPOLECCHIA, Alessandro (Sapienza University of Rome); Dr D'ALESSANDRO, Giuseppe (Sapienza University of Rome); Prof. DE PETRIS, Marco (Sapienza University of Rome); Dr FRANCESCHET, Cristian (Università degli studi di Milano); Prof. GERVASI, Massimo (Università di Milano Bicocca); Dr LAMAGNA, Luca (Sapienza University of Rome); Mr LIMONTA, Andrea (Università di Milano Bicocca); Ms MANZAN, Elenia (Università degli studi di Milano); Ms MARCHITELLI, Elisabetta (Sapienza University of Rome); Prof. MASI, Silvia (Sapienza University, Rome Italy); Prof. MENNELLA, Aniello (Università degli studi di Milano); Dr NATI, Federico (Università di Milano Bicocca); Dr PAIELLA, Alessandro (Sapienza University of Rome); Dr PETTINARI, Giorgio (Istituto di fotonica e nanotecnologie - CNR); Prof. PIACENTINI, Francesco (Sapienza University of Rome); Prof. PICCIRILLO, Lucio (School of Physics and Astronomy - University of Manchester); Prof. PISANO, Giampaolo (Sapienza University of Rome); Dr REALINI, Sabrina (Università degli studi di Milano); Prof. TUCKER, Carole (Cardiff University); Prof. ZANNONI, Mario (Università di Milano Bicocca)

Presenter: Dr MELE, Lorenzo (Sapienza University of Rome)

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