Institute of Space Sciences

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Submillimeter galaxies Magnification bias: an interesting opportunity with/for Euclid

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This presentation synthesizes findings from our recent studies, that focus on the magnification bias observed in high-redshift submillimeter galaxies (SMGs). Our methodology employs SMGs as a background sample, emphasizing their distinctive cross-correlation signals and their role as an alternative, independent probe for cosmological studies related to mass distribution. Precise measurements of the cosmological parameters can only be obtained by using complementary techniques, putting in relevance the importance of studying alternative tools for measuring the geometry of the Universe. In this context, SMGs' Magnification Bias emerges as a powerful and sensitive cosmological probe, uniquely complementary and independent of shear. Moreover, SMGs' Magnification Bias, observable across various lens types (galaxies, QSOs, or galaxy clusters), avoids the omega_m-sigma8 degeneracy and furnishes additional direct constraints on related quantities, such as the Halo Mass Function and neutrino masses.

Building upon methodological improvements, our recent analyses refine the measurement of magnification bias signals within the ΛCDM model. By incorporating weak lensing signals within the halo model formalism and employing a Markov chain Monte Carlo algorithm, we achieve remarkable enhancements in constraining both halo occupation distribution and cosmological parameters (mean values of $\Omega_m = 0.27^{+0.02}_{-0.04}$ and $\sigma_8 = 0.72^{+0.04}_{-0.04}$ and $h = 0.79^{+0.13}_{-0.14}$). In a tomographic scenario, we can explore not only the ΛCDM model but also the evolving dark energy density in w_0CDM and w_0w_aCDM frameworks. In the w_0w_aCDM model, the results are $-1.09^{+0.43}_{-0.63}$ for w_0 and $-0.19^{+1.29}_{-1.69}$ for w_a. Our latest works focuses on optimising computational efficiency and exploring strategies for analysing different redshift bins while ensuring measurement precision.

Finally, we highlight the potential impact of incorporating additional wide area fields observed by Herschel and updated foreground catalogues as the Euclid mission, for future enhancements of this alternative cosmological probe.

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