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Cosmology from Weak Lensing Non-Gaussian Statistics

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The statistical analysis of lensed galaxies is a powerful tool to study the dark matter distribution of the Universe. For instance, the distortion of galaxy shapes induced by the large scale structure of the Universe can be used to reconstruct the projected matter density along the line-of-sight (mass maps). Mass maps are useful as they provide a wealth of information that goes beyond and complements the more traditional two-point statistics used in Cosmology. During this talk, I will present the mass map obtained using the first three years of data (Y3) of the Dark Energy Survey (DES), which is the largest curved-sky galaxy weak lensing mass map to date. I will then show the constraints on cosmological parameters from two independent analyses using non Gaussian statistics applied to the DES Y3 mass maps: moments and peaks. The constraints from these analyses are compatible with and tighter than the ones from the fiducial DES Y3 cosmic shear analysis, which only relies on two-point statistics. These results showcase the potential of non Gaussian statistics in terms of cosmological constraining power and as independent consistency check with ordinary two-point statistics.

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