ID de Contribution: **9** Type: **Non spécifié**

Precision cosmology with LSST: Development of an unbiased cosmic shear estimator

mercredi 30 octobre 2024 11:00 (20 minutes)

Since cosmic shear was first observed in 2000, it has become a key cosmological probe and promises to deliver exquisite dark energy constraints. Next-generation surveys like LSST will provide images with an unprecedented galaxy density, marking the dawn of the era of precision cosmology with cosmic shear. However, shear is inferred from coherent distortions of galaxy shapes, and the relation between galaxy ellipticities and gravitational shear is a serious potential source of bias.
We are developing a shear estimation method that makes no assumption on galaxy shapes, in order to avoid the shortcomings of a simulation-based shear calibration. Our method relies on estimating the image's second moments and evaluating how they respond to a shear applied to the coordinate system without altering the image itself.We also evaluate analytically the noise bias due to the non-linearity of the estimator, and confront it with the bias derived from noisy image simulations, which allows a fast and precise noise bias correction.

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Classification de Session: Présentations