Jeudi 12 octobre 2017 à 11h30 (IAS, bâtiment 121, salle 1-2-3)

Exploring ΛCDM and beyond with weak lensing surveys

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The current acceleration of the expansion of the universe is well explained by a cosmological constant Λ. However, theoretical questions arise on its origin and value, and the observational evidence for acceleration could very well be instead hinting at a deviation from general relativity on cosmological scales.

In this talk, I will introduce the possible explanations for this acceleration. I will then introduce the weak gravitational lensing, a key observable to probe the evolution of the universe and thus help distinguish between these explanations. Thanks to the ongoing Dark Energy Survey covering a large part of the sky and the future Euclid satellite (among other surveys), the amount of weak lensing data will steadily increase over the next decade and hopefully lead to a new understanding of our universe.

In the first part of this talk I will present the analysis and the cosmology results from the first year of observation of the Dark Energy Survey (DES). In this analysis for the first time a galaxy survey combined its own cosmic shear, galaxy-galaxy lensing and clustering measurements leading to the most precise measurements of the cosmological parameters from a galaxy survey. These results were obtained for Λ/wCDM models, marginalizing over the neutrino mass and using a Bayesian framework I will describe.

In a second part, I will show my work dedicated to testing the laws of gravity on cosmological scales from a phenomenological perspective. Cosmic shear and redshift space distortion (RSD) are complementary probes to test gravity. I will show the results using the cosmic shear data from CFHTLens, RSD measurements from BOSS DR12, along with Planck measurements, giving the tightest constraints to date on this particular parametrization of deviations from general relativity. I will also briefly show the interplay between weak lensing systematics and our modified gravity model.