Project 5.3. Large-scale cosmic density and velocity fields as cosmological probes.

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Background:

Testing general relativity (GR) and verifying its validity in the large-scale regime became one of the main goals of the 21st-century extra-galactic astronomy. This is indeed a pressing issue since GR has only been rigorously tested in the Solar System and on smaller scales. At present, by using Einstein's theory to describe the whole observable Universe, we make an extrapolation of 15 orders of magnitude. Thus, in the last decade efforts aimed at delivering precise cosmological GR tests have significantly intensified.

The PhD student will learn new essential skills and scientific knowledge during the implementation of this project. This person's main task will be to conduct, post-process, and participate in analysis of numerical simulations in the context of searching for cosmological signals. The PhD thesis in our project can focus either on the numerical-simulation part or on the data analysis, both in the context of the new stringent tests of GR on cosmological scales. Our team is an affirmative action/equal opportunity group and values equality of opportunity, human dignity and diversity, thus females and minorities are particularly encouraged to apply.

Aim:

The offered position will be within the Computational Cosmology Group, in which we test and implement a novel approach that consists of using low-order statistics of galaxy velocities and clustering for testing GR and searching for Dark Energy signatures on intergalactic scales.

Requirements:

- We are looking for a highly motivated student,
- An ideal candidate would be a person with a good background in theoretical physics and/or computational sciences with a relevant MSc in physics, astronomy or computer sciences,
- Fluency in written and spoken English is required,
- A good track-record of involvement in any previous research project will be an additional asset,
- Good numerical data analysis and programming skills are essential.