Dipartimento di Fisica
Università di Cagliari
INFN, Sezione di Cagliari

High Energy Physics Colloquia

7 marzo 2017 · ore 15:00 · aula C

Francesca Lepori *SISSA, Trieste*

On Relativistic Effects and Large-Scale Cosmology

Inhomogeneities in the distribution of galaxies trace the underlying inhomogeneous distribution of dark matter. Therefore, galaxy surveys are crucial for testing the growth of dark matter perturbations and the theory of gravitation. The observable quantity in a galaxy survey is the galaxy number count, i.e. the observed fluctuation of galaxy in a redshift bin at a certain solid angle. Beside the density perturbation, the velocity and the metric distort our observed coordinate system and therefore affect the observable. These distortions are often referred to as "relativistic effects", since their systematic computation requires to solve the geodesic equations for the observed photons' path. Relativistic effects need to be included in the cosmological analysis in order to fully exploit the improved precision and accuracy of the upcoming experiments and, on the other side, their detection would provide a consistency test for general relativity. In my seminar I will discuss the relevance of this relativistic distortions in the era of precision cosmology and I will present some results related to this topic.

Riccardo Murgia *SISSA, Trieste*

Dark Matter at Small-Scales: A General Approach

According to the standard cosmological model (ΛCDM model), the present Universe is mainly composed by a cosmological constant (Λ) and by cold dark matter (CDM). Whereas this standard paradigm is favoured by large-scale observations, it clearly shows some limits at sub-galaxy scales. The effect of the existence of "non-cold" dark matter particles is a suppression of the matter power spectrum $P(k)$ on small scales, usually described by the so-called transfer function $T(k)$. Therefore, many "non-cold" dark matter candidates have been proposed in order to give a better description of the structure formation and distribution at small scales. Most of the constraints obtained so far, refer to a very specific shape of the power suppression, corresponding to thermal warm dark matter. Nonetheless, most of the viable dark matter candidates do not have a thermal momentum distribution. In this seminar, I will introduce a new analytical fitting formula for the transfer function $T(k)$, which is able to reproduce a large variety of shapes in the suppression of the power spectrum. I will show that this more general formula describes well the behaviour of the most popular dark matter candidates. Finally, I will present the first astrophysical constraints on its free parameters. This is the first step towards a general comprehensive modelling of small-scale departures from the standard model.

Contatti:

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