



Universidad del País Vasco
Euskal Herriko Unibertsitatea
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Seminarios de Física Teórica Fisika Teorikoa: Hitzaldiak

Cosmology with a non-comoving dark sector

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Abstract One of the fundamental assumptions of the standard Λ CDM cosmology is that, on large scales, all the matter-energy components of the Universe share a common rest frame. This seems natural within the visible sector, that has been in thermal contact and tightly coupled in the primeval Universe. However, the dark sector does not have any non-gravitational interaction known to date and therefore, there is no a priori reason to impose that it is comoving with ordinary matter. In this talk we will explore the consequences of relaxing this assumption and study the cosmology of non-comoving fluids. We will show that it is possible to construct a homogeneous and isotropic cosmology with a collection of fluids moving with non-relativistic velocities. Our model extends Λ CDM with the addition of a single free parameter β_0 , the initial velocity of the visible sector with respect to the frame that observes a homogeneous and isotropic universe. This modification gives rise to a rich phenomenology, while being consistent with current observations for $\beta_0 < 1.6 \times 10^{-3}$ (95% CL). We will present the general framework to describe a non-comoving cosmology and extract its first observational consequences for large-scale structure. Among the observable effects, we find sizeable modifications in the density-velocity and density-lensing potential cross-correlation spectra. These corrections give rise to deviations from statistical isotropy with a dipolar structure. The relative motion between the different fluids also couples vector and scalar modes, the latter acting as sources for metric vector modes and vorticity for all the species. Finally we will show how the produced plasma vorticity can be the source of cosmic magnetic fields through the Harrison mechanism.

Prof. A. Chamorro Seminar Room, Dept. of Theoretical Physics, Corridor 4.-2.

WEDNESDAY, Jun. 19th, 2019

Time:11:40 am