Seminario Interdisciplinare
(Fisica-Filosofia)

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Dipartimento di Fisica, Polo Scientifico (Sesto Fiorentino)
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Orario: 15-18

Cosmologia: esperimenti e problemi concettuali

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Sabino Matarrese (*Dipartimento di Fisica, Padova*)

Dark energy in the universe

In this talk I'll first review the observational evidence for the existence of a smooth "dark-energy" component in the Universe, with negative pressure, which is responsible for the recent phase of accelerated cosmic expansion and accounts for about 2/3 of the energy budget of the Universe today. Possible explanations for this exotic component (vacuum energy, "quintessence", backreaction, etc.) are discussed. Understanding the nature and the physical properties of such a dark component of the Universe represents one of the major challenges of modern cosmology and particle physics.

Henrik Zinkernagel *(Department of Philosophy, Granda)*

Cosmology and the interplay between classical and quantum physics

In this talk I examine some of the relations between quantum (field) theory and classical theory in the cosmological context. I review the cosmological constant problem which arises on the interface between quantum field theory and general relativity, and I discuss how this problem may suggest either that there is no real vacuum energy or that the present understanding of the connection between general relativity and quantum field theory is incorrect. I also consider what can be called the cosmic measurement problem which concerns the contemplated quantum-classical transition in cosmology. I argue that quantum theory is conceptually dependent on a classical space-time framework, and that the cosmic measurement problem may suggest that not everything is quantum.