An Introduction to Relativistic Cosmology

Mauro Carfora (Università di Pavia)

The course is a gentle introduction to relativistic cosmology without assuming an a priori knowledge of general relativity. We introduce the notion of a cosmological model and discuss various examples both in flat and curved spacetimes: The Milne, the Rindler, and the Friedmann-Lemaître-Robertson-Walker (FLRW) models; their associated horizons and global properties will be analyzed in detail. The role of the Cosmological Principle in its modern interpretation is discussed in terms of the scale-dependent statistical isotropy and homogeneity of the observed Universe. Emphasis will be on a mathematically rigorous presentation of the various notions introduced. We will pay particular attention to the standard model of cosmology governed by Dark Energy (in the form of Einstein's cosmological constant Λ) and by Cold Dark Matter evolving in a FLRW spacetime with flat space sections (the ΛCDM concordance model).