

## Lecture proposal

### Title: **PRIMORDIAL COSMOLOGY**

Contents: These ten Lectures, for a total amount of 20 hours, face basic themes in Theoretical Cosmology, both on a classical and a quantum level. First, the morphology of the early Universe is analyzed in the framework of the Standard Cosmological Model, discussing all the fundamental phases of its thermal history. Then, a consistent picture of the Inflationary Scenario is provided, including the generation of density inhomogeneities. The second part of the Course is dedicated to trace the most important open questions in Early Cosmology, up to the possibility of a quantum treatment of the primordial Universe dynamics. After the characterization of the Mini-superspace in terms of the homogeneous Bianchi Universe, the canonical quantum procedure is implemented on the cosmological dynamics and the concept of Bouncing Cosmology is outlined.

Dates: The Course will be held from the middle of April to the middle of May.

### Program:

- Einsteinian physics
- Isotropic Universe geometry and dynamics
- Thermal history
- Standard Model paradoxes
- Inflation paradigm
- Homogeneous cosmological models
- Hamiltonian formulation of the Bianchi Universes
- Chaotic cosmologies
- Canonical quantum cosmology
- Big-Bounce cosmology