



UNIVERSITA' DEGLI STUDI DI PAVIA



FONDAZIONE
CARIPLO

DOTTORATO DI RICERCA IN FISICA

*The Graduate Course Spacetime Structure, Cosmology,
and QFT, will host a series of special Lectures by*

Prof. Thomas Buchert

CRAL

Observatoire de Lyon

The Averaging Problem in Cosmology

In this course we address the averaging problem both in Newtonian Cosmology and in Relativistic Cosmology. We introduce in each theory the basic equations and propose to spatially average the scalar parts of the general equations without further restricting the problem. The result are effective cosmological equations that are discussed with respect to a number of aspects:

- (i) Non-commutativity of averaging and time-evolution;
- (ii) Backreaction terms; (iii) Integral properties of Newtonian models and their relation to morphological measures; (iv) Newton's iron sphere theorem; (v) The architecture of numerical simulations in Cosmology;
- (vi) Coupling of matter inhomogeneities to intrinsic curvature in relativistic models; (vii) Relations to information theoretical measures;
- (viii) Relation to scalar field theories; (ix) Global gravitational instability and far-from-equilibrium state equations; (x) Cosmological principles and the global topology of the Universe; (xi) Examples of averaged inhomogeneous cosmologies and comparison with the standard model of cosmology; (xii) Dark Energy and Dark Matter problems.

**Prof. Buchert will deliver the lectures in
Aula A102, starting Monday June 4 at 14:00-16:00**