NITheCS
National Institute for Theoretical and Computational Sciences

NITheCS Mini-School
Tuesday, 7, 14, 21 and 28 September 2021, 14h00

Prof Martin Bucher | Dept of Physics, UKZN; Laboratoire APC, University of Paris; LPENS, Ecole Normale Supérieure, Paris

"Mapping the Initial Conditions of the Universe: Exploring the Cosmic Microwave Background"

ABSTRACT

A major goal of modern astronomy is to simulate our universe numerically from its beginnings to the present day in order to confront our theoretical understanding with the observations. Carrying out this program requires knowledge of the initial conditions, and somewhat surprisingly, more is known about the very early universe, in which these initial conditions can be characterized with great precision, than about the Dark Ages and Cosmic Dawn when the first stars and quasars appeared, epochs which will soon be explored by the SKA.

I will explain how observations of the 2.73 K cosmic microwave background (CMB) radiation have allowed us to map out precisely the initial conditions of the universe, thus establishing an observational foundation for modern cosmology. These four lectures will cover both theory and observation.

Homogeneous and Isotropic Cosmological Models and their Perturbations	**Physics of the Cosmic Microwave Background**
7 September 2021, 14h00	**14 September 2021, 14h00**
Observations of the Cosmic Microwave Background	**Unfinished Business: Searching for Primordial Gravitation Waves From Inflation**
21 September 2021, 14h00	**28 September 2021, 14h00**

BIOGRAPHY

Martin Bucher is CNRS Directeur de recherche based at the Université de Paris; Ecole Normale Supérieure in Paris, and Fractional Professor of Physics at UKZN. He has made numerous contributions to theoretical cosmology and worked on the European Space Agency's Planck Mission, which mapped the CMB sky in both temperature and polarisation. He was awarded the Gruber Prize in Cosmology as part of the Planck team. Before settling in France, he was SW Hawking Fellow of Mathematical Sciences and College Lecturer at the University of Cambridge. He has held postdoctoral positions at the Institute for Advanced Study, Princeton University and the CN Yang Institute of Theoretical Physics. He received his PhD from Caltech under the direction of John Preskill.

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