The Extreme Cosmos

From the Big Bang to Black Holes

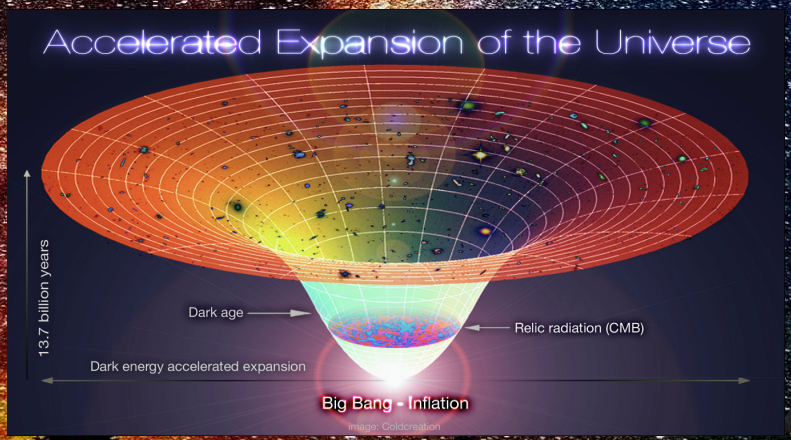
Lecture 10

Dark Energy and the Cosmological Constant Problem

Abstract:

The discovery of the accelerating expansion of the late time universe at the end of 1998 ushered in a new era of cosmology. Soon a new terminology, dark energy, was born that refers to the substance that is responsible for this accelerating expansion effect, whose nature is yet to be determined. Many theories that treats dark energy as a dynamical field were proposed in the past 20 years, but there is as yet no consensus about what dark energy really is. Observations indicate that the cosmological constant (CC) introduced by Einstein a century ago remains a viable candidate for dark energy. Microscopically, the vacuum energy associated with quantum fields of elementary particles is a natural microscopic interpretation of CC, yet the latter is infamously larger than the former by more than 120 order of magnitude. The is the well-known cosmological constant problem. Before 1999, the (old) CC problem was whether CC can be put to zero. In the post-dark energy era after 1999, the new CC problem has become why CC is so minutely nonzero, which seems even more challenging to address than its older version. In this talk I will review both the old and the new CC problem and the various proposed solutions to it. I will then turn to the question about how to distinguish a dynamical dark energy from CC through direct observations.

Date: 11:00, Feb. 13, 2020
Place: André Berthelot conference room – BG 141 – CEA Paris Saclay research center – DPhP Department de Physique des particules
Registration mandatory to martine.oger@cea.fr + 33 (0)1 69 08 23 50



Prof. Pisin Chen
National Taiwan University

2018  **Chaires Blaise Pascal**

Région îledeFrance
ÉCOLE POLYTECHNIQUE EXECUTIVE EDUCATION
ÉCOLE POLYTECHNIQUE
INSTITUT POLYTECHNIQUE DE PARIS
cea université PARIS SACLAY