Cosmology January-March 2013

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Course Aims

To learn the basics of modern cosmology, and in particular the foundations of the Hot Big Bang theory. The course is primarily theoretical, though with some observational input, and focuses on the application of different aspects of physics on the grandest possible scale.

Objectives

By the end of the course, you should be able to:

- Detail the evidence supporting the *hot big bang* theory
- Make *predictions* from *cosmological models* which can be compared against *observations*
- Use modern observational data to *constrain the cosmological parameters* and understand the physical basis behind their determination
- Appreciate the *wide range of physics* which finds simple applications in cosmology
- Undertake further study on the topic at postgraduate level

Prerequisites

In the past, students have found material from both *Astrophysics* and *General Relativity* to be useful in understanding the material in the course.

Outline Syllabus

- Introduction & History
- Cosmological Models
- Newtonian theory
- General Relativity
- FRW cosmology
- Cosmography & Cosmological Parameters
- Thermodynamics & The Hot Big Bang
- Baryogenesis and the Sakharov Conditions
- Big-Bang Nucleosynthesis
- Cosmic Microwave Background
- Open questions in the Hot Big Bang
- Inflation
- Structure Formation
- Large-Scale structure
- Galaxy Formation
- Fluctuations in the CMB

Textbooks

- M. Rowan-Robinson, *Cosmology*
- A. Liddle, *An Introduction to Modern Cosmology*
- P. Schneider, *Extragalactic Astrophysics and Cosmology*