

Introduction to Cosmology

The next two topics in the course are Gravitational Lenses and The Cosmic Microwave Background. Both these areas are extremely useful in learning about the structure and history of our Universe. In order to set them in context we begin with a quick review of the current state of cosmology, focussing on concepts particularly relevant to this course.

We begin by giving a mathematical description of the expansion of the universe, and use this to answer the question, 'Does the Universe expand faster than the speed of light?'. Next, we have a close look at the concept of the 'curvature of the Universe', because one of the most recent achievements of CMB cosmology is the first reasonably accurate measurement of this curvature. We pay particular attention to the often-neglected idea that the Universe could have a complicated topology or connectedness, since the space mission WMAP had much to say on this issue. Like much of cosmology, a major focus of CMB studies is to measure the various density parameters, known as Ω s (greek letter Omega), and Section 1.3 shows precisely what these numbers are and what they tell us about the Universe. Finally Section 1.4 quickly looks at present measurements of the various Ω s from methods other than the CMB.

Please note that any forward links to section 2 (the CMB) will not be connected until that part of the course is released.

- [1. Introduction to Cosmology](#)
 - [1.1 Cosmological expansion and redshift](#)
 - [1.2 The Geometry of the Universe](#)
 - [1.3 Dynamics of the Universe](#)
 - [1.4 Observational cosmology](#)
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