Mathematical Tripos

Part II

Cosmology

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Lectures by

Notes by
mostanes

0 Preface

These are some sketches based on the Cosmology lectures. Content that is deemed trivially known is glossed over.

1 List of terms and abbreviations

LSS	Large Scale Structure
AGN	Active Galactic Nuclei
SGR	Soft Gamma Repeater
GRB	Gamma-Ray Burst
CMB	Cosmic Microwave Background
AU	Astronomical Unit
ly	light-year

2 Introduction

2.1 The Expanding Universe

Properties of the universe: homogeneous and isotropic (on scales $\gg 10$ Mpc).
Constituents: Large Scale Structure (Galaxies - AGNs, Quasars, etc.), CMB

2.2 Units

- time: year, Gy (fun note: 1 year $\approx \pi 10^7 s$ up to $\sim 0.5\%$ accuracy in the Gregorian calendar)
- distances: AU, pc
  - pc $\sim$ distance between neighboring stars in a galaxy
  - Mpc $\sim$ intergalactic distances
  - Gpc $\sim$ largest structures of the universe
- Natural units: $c = \hbar = k_B = 1$.
- Planck units: Natural units + $G = 1$.

2.3 Cosmic distance ladder

How to measure distances on a cosmic scale? Successive units of comparison:

- Cepheid stars
- Type IA supernova
- Redshift*

* - not in the lecture (yet?)