

<<现代宇宙学>>

图书基本信息

书名：<<现代宇宙学>>

13位ISBN编号：9787506291996

10位ISBN编号：7506291991

出版时间：2008-10-1

出版时间：世界图书出版公司

作者：Scott Dodelson

页数：440

版权说明：本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问：<http://www.tushu007.com>

前言

The Men of the Great Assembly had three sayings: "Be patient before reaching a decision; Enable many students to stand on their own; Make a fence around your teaching." Ethics of the Fathers 1:1 There are two aspects of cosmology today that make it more alluring than ever. First, there is an enormous amount of data. To give just one example of how rapidly your knowledge of the structure of the universe is advancing, consider galaxy surveys which map the sky. In 1985, the state-of-the-art survey was the one carried out by the Center for Astrophysics; it consisted of the positions of 1100 galaxies. Today, the Sloan Digital Sky Survey and the Two Degree Field between them have recorded the 3D positions of half a million galaxies. The other aspect of modern cosmology which distinguishes it from previous efforts to understand the universe is that we have developed a consistent theoretical framework which agrees quantitatively with the data. These two features are the secret of the excitement in modern cosmology: we have a theory which makes predictions, and these predictions can be tested by observations. Understanding what the theory is and what predictions it makes is not trivial. First, many of the predictions are statistical. We don't predict that there should be a hot spot in the cosmic microwave background (CMB) at $RA = 15h, dec = 27^\circ$. Rather, predictions are about the distribution and magnitude of hot and cold spots. Second, these predictions, and the theory on which they are based, involve lots of steps, many arguments drawn from a broad range of physics. For example, we will see that the distribution of hot and cold spots in the CMB depends on quantum mechanics, general relativity, fluid dynamics, and the interaction of light with matter. So we will indeed follow the first dictum of the Men of the Great Assembly and be patient before coming to judgment. Indeed, the fundamental measures of structure in the universe—the power spectra of matter and radiation—agree extraordinarily well with the current cosmological theory, but we won't have the tools to understand this agreement completely until Chapters 7 and 8. Sober minds have always known that it pays to be patient before pronouncing judgment on ideas as lofty as those necessary to understand our Universe. The modern twist on this "Be patient" theme is that we need to set up the framework (in this case Chapters

<<现代宇宙学>>

内容概要

There are two aspects of cosmology today that make it more alluring than ever. First, there is an enormous amount of data. To give just one example of how rapidly our knowledge of the structure of the universe is advancing, consider galaxy surveys which map the sky. In 1985, the state-of-the-art survey was the one carried out by the Center for Astrophysics; it consisted of the positions of 1100 galaxies. Today, the Sloan Digital Sky Survey and the Two Degree Field between them have recorded the 3D positions of half a million galaxies.

<<现代宇宙学>>

作者简介

作者：(英国)都德尔逊 (Scott Dodelson) Scott Dodelson：美国费米国家实验室理论天体物理研究组负责人和芝加哥大学天文和天体物理学系教授。

在哥伦比亚大学获博士学位。

进入费米国家实验室和芝加哥大学前在哈佛大学做研究员。

在宇宙论方面发表了七十多篇论文，其中大部分是关于宇宙的微波背景和大尺度结构。

目次：标准模型及其它；平坦扩张的宇宙；远离平衡态；波尔兹曼方程；爱因斯坦方程；初始条件；多样性；各项异性；多样性的探测；弱透镜化和偏振；分析；附录A：部分习题解答；附录B：常数；附录C：特殊函数；附录D：符号；参考文献；索引。

读者对象：理论物理、天体物理和宇宙学等专业的高年级本科生、研究生和相关专业的科研人员。

书籍目录

1 The Standard Model and Beyond 1.1 The Expanding Universe 1.2 The Hubble Diagram 1.3 Big Bang Nucleosynthesis 1.4 The Cosmic Microwave Background 1.5 Beyond the Standard Model 1.6 Summary Exercises2 The Smooth, Expanding Universe 2.1 General Relativity 2.1.1 The Metric 2.1.2 The Geodesic Equation 2.1.3 Einstein Equations 2.2 Distances 2.3 Evolution of Energy 2.4 Cosmic Inventory 2.4.1 Photons 2.4.2 Baryons 2.4.3 Matter 2.4.4 Neutrinos 2.4.5 Dark Energy 2.4.6 Epoch of Matter-Radiation Equality 2.5 Summary Exercises3 Beyond Equilibrium 3.1 Boltzmann Equation for Annihilation 3.2 Big Bang Nucleosynthesis 3.2.1 Neutron Abundance 3.2.2 Light Element Abundances 3.3 Recombination 3.4 Dark Matter 3.5 Summary Exercises4 The Boltzmann Equations 4.1 The Boltzmann Equation for the Harmonic Oscillator 4.2 The Collisionless Boltzmann Equation for Photons 4.2.1 Zero-Order Equation 4.2.2 First-Order Equation 4.3 Collision Terms: Compton Scattering 4.4 The Boltzmann Equation for Photons 4.5 The Boltzmann Equation for Cold Dark Matter 4.6 The Boltzmann Equation for Baryons 4.7 Summary Exercises5 Einstein Equations 5.1 The Perturbed Ricci Tensor and Scalar 5.1.1 Christoffel Symbols 5.1.2 Ricci Tensor 5.2 Two Components of the Einstein Equations 5.3 Tensor Perturbations 5.3.1 Christoffel Symbols for Tensor Perturbations 5.3.2 Ricci Tensor for Tensor Perturbations 5.3.3 Einstein Equations for Tensor Perturbations 5.4 The Decomposition Theorem 5.5 From Gauge to Gauge 5.6 Summary Exercises6 Initial Conditions 6.1 The Einstein-Boltzmann Equations at Early Times 6.2 The Horizon 6.3 Inflation 6.3.1 A Solution to the Horizon Problem 6.3.2 Negative Pressure 6.3.3 Implementation with a Scalar Field 6.4 Gravity Wave Production 6.4.1 Quantizing the Harmonic Oscillator 6.4.2 Tensor Perturbations 6.5 Scalar Perturbations 6.5.1 Scalar Field Perturbations around a Smooth Background 6.5.2 Super-Horizon Perturbations 6.5.3 Spatially Flat Slicing 6.6 Summary and Spectral Indices Exercises7 Inhomogeneities 7.1 Prelude 7.1.1 Three Stages of Evolution 7.1.2 Method 7.2 Large Scales 7.2.1 Super-horizon Solution 7.2.2 Through Horizon Crossing 7.3 Small Scales 7.3.1 Horizon Crossing 7.3.2 Sub-horizon Evolution 7.4 Numerical Results and Fits 7.5 Growth Function 7.6 Beyond Cold Dark Matter 7.6.1 Baryons 7.6.2 Massive Neutrinos 7.6.3 Dark Energy Exercises8 Anisotropies 8.1 Overview 8.2 Large-Scale Anisotropies 8.3 Acoustic Oscillations 8.3.1 Tightly Coupled Limit of the Boltzmann Equations 8.3.2 Tightly Coupled Solutions 8.4 Diffusion Damping 8.5 Inhomogeneities to Anisotropies 8.5.1 Free Streaming 8.5.2 The Cl's 8.6 The Anisotropy Spectrum Today 8.6.1 Sachs-Wolfe Effect 8.6.2 Small Scales 8.7 Cosmological Parameters 8.7.1 Curvature 8.7.2 Degenerate Parameters 8.7.3 Distinct Imprints Exercises9 Probes of Inhomogeneities 9.1 Angular Correlations 9.2 Peculiar Velocities 9.3 Direct Measurements of Peculiar Velocities 9.4 Redshift Space Distortions 9.5 Galaxy Clusters Exercises10 Weak Lensing and Polarization 10.1 Gravitational Distortion of Images 10.2 Geodesics and Shear 10.3 Ellipticity as an Estimator of Shear 10.4 Weak Lensing Power Spectrum 10.5 Polarization: The Quadrupole and the Q/U Decomposition 10.6 Polarization from a Single Plane Wave 10.7 Boltzmann Solution 10.8 Polarization Power Spectra 10.9 Detecting Gravity Waves Exercises11 Analysis 11.1 The Likelihood Function 11.1.1 Simple Example 11.1.2 CMB Likelihood 11.1.3 Galaxy Surveys 11.2 Signal Covariance Matrix 11.2.1 CMB Window Functions 11.2.2 Examples of CMB Window Functions 11.2.3 Window Functions for Galaxy Surveys 11.2.4 Summary 11.3 Estimating the Likelihood Function 11.3.1 Karhunen-Loeve Techniques 11.3.2 Optimal Quadratic Estimator 11.4 The Fisher Matrix: Limits and Applications 11.4.1 CMB 11.4.2 Galaxy Surveys 11.4.3 Forecasting 11.5 Mapmaking and Inversion 11.6 Systematics 11.6.1 Foregrounds 11.6.2 Mode Subtraction ExercisesA Solutions to Selected ProblemsB Numbers B.1 Physical Constants B.2 Cosmological ConstantsC Special Functions C.1 Legendre Polynomials C.2 Spherical Harmonics C.3 Spherical Bessel Functions C.4 Fourier Transforms C.5 MiscellaneousD SymbolsBibliographyIndex

<<现代宇宙学>>

章节摘录

插图：

<<现代宇宙学>>

编辑推荐

《现代宇宙学》的特色：（1）讲解了现代宇宙学的理论基础，处理方法和具体解释，阐明了当前在宇宙学研究中的深刻思想；（2）涵盖了过去十年中在宇宙学研究中的重大进展；（3）包括了上百幅很有特色的教学图片。

<<现代宇宙学>>

版权说明

本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问:<http://www.tushu007.com>