



# Modern Cosmology

By Scott Dodelson

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## Modern Cosmology By Scott Dodelson

*Modern Cosmology* begins with an introduction to the smooth, homogeneous universe described by a Friedman-Robertson-Walker metric, including careful treatments of dark energy, big bang nucleosynthesis, recombination, and dark matter. From this starting point, the reader is introduced to perturbations about an FRW universe: their evolution with the Einstein-Boltzmann equations, their generation by primordial inflation, and their observational consequences. These consequences include the anisotropy spectrum of the cosmic microwave background (CMB) featuring acoustic peaks and polarization, the matter power spectrum with baryonic wiggles, and their detection via photometric galaxy surveys, redshift distortions, cluster abundances, and weak lensing. The book concludes with a long chapter on data analysis.

*Modern Cosmology* is the first book to explain in detail the structure of the acoustic peaks in the CMB, the E/B decomposition in polarization which may allow for detection of primordial gravity waves, and the modern analysis techniques used on increasingly large cosmological data sets. Readers will gain the tools needed to work in cosmology and learn how modern observations are rapidly revolutionizing our picture of the universe.

- Provides foundations, calculations, and interpretations which illuminate current thinking in cosmology
- Covers the major advances in cosmology over the past decade
- Includes over 100 unique, pedagogical figures

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## Editorial Review

### Review

"...I like the choice of topics and detailed derivations of some of the basic processes which cannot be found in any other textbook and which really make this book a textbook out of which one can actually learn something. Examples include detailed derivation of inflationary spectrum, Boltzmann equation etc. ... I also like the extensive list of problems at the end of each chapter. This is a great textbook that is long overdue given the importance of the subject..." --**Uros Seljak, Princeton University**

"This book is very up to date and gives excellent treatments of structure formation...This provides what is the most complete such description in an textbook." ?**Paul H. Frampton, Universtiy of North Carolina at Chapel Hill, CERN COURIER (Oct 2003)**

"(In) Dodelson's *Modern Cosmology* we have recently obtained an appropriate textbook for the dawn of this new epoch...In a sense, this book is postmodern cosmology (with an affirmative connotation!), in being the first to consider the new wave of challenges for this oldest scientific philosophical pursuit...it provides an excellent introduction to some of the most dynamical areas in physics and astronomy, very likely to remain attractive for at least a couple of decades." ?**Milan M. Cirkovic, Astronomical Obervatory of Belgrade, FOUNDATIONS OF PHYSICS (Oct 2003)**

"Dodelson writes well and the mathematical derivations are generally well laid out and easy to follow. Useful sets of exercises appear at the end of each chapter, along with suggestions for further reading, often with amusing commentaries. New graduate students, Dodelson's intended audience should find it easy to learn from this book." --**George Efstathiou, University of Cambride, England (July 2004)**

### From the Back Cover

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Readers will gain the tools needed to work in cosmology and will learn how modern observations are rapidly revolutionizing our picture of the universe.

### About the Author

Scott Dodelson is Head of the Theoretical Astrophysics Group

at Fermilab and Associate Professor in the Department of

Astronomy and Astrophysics at the University of Chicago.

He received in Ph.D. at Columbia University and was a research

fellow at Harvard before coming to Fermilab and Chicago.

He is the author of more than seventy papers on cosmology,

most of which focused on the cosmic microwave background and

the large scale structure of the universe.

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#### **Adam Rucks:**

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**Benjamin Hoffman:**

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