

**Big-Bang Cosmology**

**Big-Bang Nucleosynthesis**

**The Cosmological Parameters**

**Dark Matter**

**Dark Energy**

**Cosmic Microwave Background**

Strong team effort-from all participating authors

**Experimental Tests of Gravitational Theory**

**Cosmic Rays**

## Big-Bang Cosmology

K. Olive and J. Peacock - since 2001

**Includes “text-book” material on standard big-bang, observational cosmology, and early Universe.**

- **These have not changed much over time.**
- **Updates due to new Planck parameter values.**

**Updates frequently occur in section on the Universe at late times:**

- **Observational Cosmology;**
- **CMB, structure formation;**
- **BAO; weak lensing, dark energy**

## Big-Bang Nucleosynthesis

B. Fields and S. Sarkar - since 2001; P. Molaro added in 2013

**Review of Standard BBN - theory and observations**

**Updates due to WMAP and new light element determinations.**

**Significant changes due to new D/H determinations.**

**Adding Molaro brings in a better observational perspective.**

## The Cosmological Parameters

O. Lahav and A. Liddle - since 2003

**Review of determination and values of standard cosmological parameters -  $h$ ,  $\Omega_m$ ,  $\Omega_b$ ,  $\Omega_\Lambda$ ,  $\Omega_r$ ,  $\Omega_\nu$ ,  $\sigma_8$ ,  $n$ ,  $r$ ,  $\tau$ ,  $b$**

**Updates due to Planck, BAO, large scale structure surveys (SDSS, WiggleZ).**

**More on Relativistic Species and Neutrino limits  
Less on Dark Energy; SN probes**

## Dark Matter

M. Drees and G. Gerbier - since 2003

**Dark Matter - Theory (Drees) - Experiment (Gerbier)**

**Updates dominated by new experimental searches**

**One of the more fluid of the reviews as there are a large number of experiments releasing data several times per year (LUX results added in before the dead-deadline!)**

**Reviews are cautious and do not proclaim purported “discoveries” - e.g. PAMELA/ATIC/Fermi/AMS.**

## Cosmic Microwave Background

D. Scott and G. Smoot - since 1996  
**Major update due to Planck results**

**other CMB experiments (ACT; SPT) also included**

**New:**

- Polarization data (QUIET)
- 1st BB signal from lensing (SPT)
- Results on Non-Gaussianities (Planck)
- Anomalies
- BICEP2 results added in appendix (past deadline)  
with appropriate caution.

**Updated Cosmological Parameters**

**There is some overlap with the Parameters review**

## Dark Energy

M. Mortonson, D. Weinberg and M. White - NEW 2013

**New Dedicated review on Dark Energy**

**Dark Energy vs Modified Gravity  
Cosmological Constant**

**Observational probes: CMB; SNIa; BAO**

**Putting the constraints together on eq. of state parameter  $w$ ,  
and its possible variation with expansion.**

## Summary

**Downloads since release of 2014 web version.**

- 11319 "The cosmological parameters"**
- 7217 "Dark matter"**
- 6826 "Dark energy"**
- 6361 "Big-Bang cosmology"**
- 5081 "Astrophysical constants"**
- 4825 "Cosmic microwave background"**
- 3512 "Big-Bang nucleosynthesis"**

all in the top 33 out of 122 reviews



## Summary

### Outlook:

**Planck Polarization Data - due soon.**

**This will have a major impact on several of the reviews.**

**Planck vs BICEP2 - Reviews took a cautious approach, may be able to be more definite.**

**BBN connection to CMB will be expanded.**

**DE will see its first round of revisions.**

**“Normal” updates to DM, BBC**

**Expansion: Discussions of possible new reviews on  
Inflation; Neutrinos**

## Summary

**Very much a team effort**

**In addition to external reviews, each review is read by almost all authors with detailed comments (primarily from S. Sarkar, A. Liddle, D. Scott (and me)).**

**Significant effort is made to coordinate reviews and values of quantities quoted - revisions often continue to the last possible moment**

**Continued help from D. Groom is always appreciated.**