

**Cover illustration**

Modified from a detailed picture of the infant Universe. (Original image is courtesy of the WMAP/NASA science team.)

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# EARLY UNIVERSE

**C**osmology has come a long way in a rather short time. When I was a graduate student 20 years ago, a galaxy with a high redshift was one at  $z \approx 1$  (and quasars were known out to  $z \approx 2$ ). Now we know of many distant galaxies at redshifts up to about 6.5 and there are controversial candidates beyond that. We have moved from a model in which mass is dominated by dark matter to one where an even more mysterious dark energy is the main component of the Universe.

In order to highlight recent advances, *Nature* has commissioned a diverse group of people to write about their subjects and how they are developing our understanding of the Universe. This collection seems particularly timely in the light of the recent release of three years of data from WMAP — the Wilkinson Microwave Anisotropy Probe.

Chuck Bennett discusses mysteries that have arisen as the data become ever more tightly constrained by the evolving 'standard model', while Sean Carroll probes the more philosophical question of why our Universe is the way it is. Volker Springel, Carlos Frenk and Simon White find that the growth of structure in the Universe is a powerful way to compare the predictions of the standard model with observations of clusters of galaxies. And Esther Hu and Len Cowie examine recent work at the level of individual galaxies, which concludes that star formation reached its peak when the Universe was about half its present age. Finally, John Cowan and Chris Sneden look at patterns in the abundance of heavy elements in the oldest stars in our Galaxy to infer what kinds of star preceded them.

We hope that you enjoy this collection.

Leslie Sage, Senior Editor

## REVIEWS

### 1126 Cosmology from start to finish

Charles L. Bennett

### 1132 Is our Universe natural?

Sean M. Carroll

### 1137 The large-scale structure of the Universe

Volker Springel, Carlos S. Frenk &amp; Simon D. M. White

### 1145 High-redshift galaxy populations

Esther M. Hu &amp; Lennox L. Cowie

### 1151 Heavy element synthesis in the oldest stars and the early Universe

John J. Cowan &amp; Christopher Sneden

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