Although this volume is the third in a trilogy, it is quite different from its two predecessors, and it stands on its own. It seems much closer than the others to being a true textbook and could work well with any of several excellent quantum field theory texts as its front end. May a new generation of students imbibe its content and spirit, and may it become the user's manual for the Large Hadron Collider!

Cosmological Physics

John A. Peacock
Cambridge U. P., New York, 1999. 682 pp. $85.00 hc ($39.95 pb) ISBN 0-521-41072-X hc (0-521-42270-1 pb)

Even under the best of circumstances, writing a text on modern cosmology is not easy. In the first place, the field is developing at a lightning pace; new observations have daily been revolutionizing our picture of the large-scale structure of the universe. Next, there is the question of what to include and what not to. A proper appreciation of this field requires input from particle physics, astrophysics, and general relativity, at the very least. One must therefore choose whether to assume some knowledge of each of these fields, or whether to provide a pretense of an introduction to each of them. Otherwise, one must provide three textbooks in one, and this has, to date, been largely beyond anyone's ambitions.

John Peacock however, has taken up this latter challenge, and he has very largely succeeded. His *Cosmological Physics* is a remarkable book, both for its scope and for its depth of understanding. I was frankly amazed to see subjects as diverse as observational constraints on the two-point galaxy–galaxy correlation function and a discussion of the beta function in non-abelian gauge theories, all treated with authority and precision. For this reason alone, this book is sure to find a place in the libraries of both graduate students and long-standing researchers in cosmology.

It is probably best to review this book by discussing the problems it doesn't have, many of which can be found in other texts.

First, it is not merely bibliographic. Some books, in an attempt to cover all the necessary material, read more like a good table of contents for a text. On the other hand, it is not intimidating, so one need not scan myriad pages to learn about a single topic. Peacock tends to get to the heart of the matter and develops just enough mathematical background to help one get a handle on new developments.

Next, it is clear, at least from my random checks, that Peacock does not discuss topics that he doesn't really understand. Nor does he merely regurgitate the equations of classic papers on various subjects. While his background is as an astrophysicist and not a particle physicist, one nevertheless gets the sense that each topic he chose to cover is one that he has studied in enough detail to get it right.

Finally, the book is not generally out of date. Because the field is changing so quickly, many well-known texts, such as Edward Kolb and Michael Turner's *The Early Universe* (Addison-Wesley, 1993), are good places to find an introduction to the field—but not the most current findings or the latest results.

This is not to say that the book is completely up to date. Several areas in which I found Peacock's treatment was somewhat behind, for example, include age determinations of globular clusters and big-bang nucleosynthesis constraints on light-element abundances, two areas in which, admittedly, I have worked and so am more familiar with the literature.

Gaps aside, Peacock's presentation is logical and coherent. He begins the book with a short but comprehensive primer on general relativity, both in the abstract and as it is applied in astrophysics. Peacock then proceeds to classic tests of cosmology, from the determination of the isotropy of the universe to gravitational lensing to the classic age and distance tests. Changing directions, he then reviews the basics of quantum field theory in a 100-page introduction that is quite comprehensive—perhaps too comprehensive for some.

Having established the necessary tools, Peacock then proceeds to explore the physics of the early universe, from the standard physics of the hot big bang model to the more exotic physics associated with both topological defects and the zoo of inflationary model building. Once again, even in these exotic areas one feels the book has been shaped by a firm hand in command of the basic principles as well as many of the details.

The latter part of the book is devoted to the empirical meat of cosmology, including observations of galaxy dynamics, the inference of dark matter, active galactic nuclei, and galaxy formation and evolution. The book ends, correctly I believe, with a discussion of cosmic microwave background fluctuations. This area will, over the next decade, carry cosmology fully into the twenty-first century and promises to constrain empirically many of the fundamental parameters of our expanding universe that have to date remained beyond the reach of observers (if not theorists).

One of the successes of this book also presents a problem for the reader or teacher. It is clear that no single graduate course can cover with any fairness all of the topics discussed. Some topics probably require a separate textbook. I have spoken to one or two colleagues who have tried to teach out of this book, and they all indicate that there is simply too much material.

Nevertheless, this book is sufficiently comprehensive so that readers wishing to brush up on a modern topic in cosmology are likely to find their basic questions addressed, a reasonable perspective on modern developments, and sufficient background so that they can move on to more detailed references. This is not faint praise. The fact that Peacock has succeeded in this regard means that this will remain a valuable reference source for some time to come, and one which both active researchers and students will want to keep handy.

LAWRENCE M. KRAUSS
Case Western Reserve University
Cleveland, Ohio

Quantum Generations: A History of Physics in the Twentieth Century

Helge Kragh
Princeton U.P., Princeton, N.J., 1999. 480 pp. $29.95 hc ISBN 0-691-01206-7

Helge Kragh is an excellent historian of modern physics who has several books and many fine articles to his credit. Thus, he was a logical person for *Princeton University Press* to ask to write a book summarizing the development of physics during the past century. However, he confesses in his preface to *Quantum Generations*, "I should have known that it is simply not possible to write a balanced and reasonably comprehensive one-volume account of twentieth century physics." He thus offers as a substitute "a fairly brief and much condensed and selective account."

Quantum Generations contains three sections, of about equal length, dealing respectively with the well-chosen periods 1890–1918, 1918–1945, and 1945–1995, followed by ten-page