

numbers, the Monte Carlo method and so on will find nice anecdotal descriptions of these topics, together with detailed notes and references to the bibliography for more detailed study. It is a good book to have.

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The Little Book of the Big Bang: A Cosmic Primer

► Craig Hogan
Copernicus (Springer-Verlag),
New York, 1998. 181 pp.
\$20.00 hc ISBN 0-387-98385-6

The Little Book of the Big Bang, by Craig Hogan, is a charming handbook describing the history of the universe as we now understand it. This well-written and comprehensive review is an excellent guide to the Big Bang. This book would be well placed on the coffee table next to Stephen Hawking's *A Brief History of Time* (Bantam, 1988).

Hogan's overview of the history of the universe contains just enough detail to give the reader a taste of current research topics, along with a clear picture of what is known—and what is knowable—about our universe. The chapter on primordial matter, one of the many areas in which Hogan has written fundamental papers, is particularly crisp and clear.

The book is dedicated to the memory of cosmologist David Schramm, who helped develop many of the fields and ideas described in *The Little Book of the Big Bang*. The foreword by Martin Rees offers a glimpse of the perspective of one of the fathers of modern cosmology.

The book flows easily and will be enjoyed by people from many backgrounds and levels of education. It gives an accurate and crisp description of our current understanding of the origin and evolution of the universe. I highly recommend it for readers of all ages.

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Pulsar Astronomy

► Andrew G. Lyne
and Francis Graham-Smith
Cambridge U. P., New York, 1998.
2nd edition. 261 pp. \$80.00 hc
ISBN 0-521-59413-8

In the last three decades, radio pulsars have received considerable attention from both physicists and astrophysicists. For physicists, they are unique laboratories in which extremes of grav-

ity, density and magnetic field produce conditions unapproachable in terrestrial labs. For astrophysicists, they are the most easily studied of the roughly one billion neutron stars in the Galaxy as well as being connected by evolutionary tracks to x-ray binaries and perhaps to soft-gamma repeaters and magnetars.

Despite this attention, pulsar research remains largely cut off from mainstream astronomy by barriers of terminology, instrumentation and technique. In 1990, Andrew Lyne and Francis Graham-Smith of the University of Manchester set out to bridge this gap with *Pulsar Astronomy* (Cambridge U. P.), a general review aimed at the graduate and advanced undergraduate level. The book replaced Graham-Smith's earlier *Pulsars* (Cambridge U. P., 1977), which had provided a thorough review of the first decade of pulsar observations but had become outdated in the 1980s, which saw the discoveries of the first millisecond pulsars, the first pulsars in globular clusters and the first eclipsing binary pulsar as well as the introduction of precision pulsar measurements to test gravity theories, and other developments. Although the field had grown beyond the scope of a single, authoritative volume, *Pulsar Astronomy* was a welcome overview.

Now the authors have updated their book to address more recent advances, including the discoveries of the first pulsar planetary system and the first two pulsars with main-sequence binary companions and an overall increase in the number of known binary pulsars by a factor of four. The new edition retains the clear, pedagogical approach of its predecessor. It covers a very broad range of topics in a concise way, and it is particularly strong in its discussions of pulsar emission phenomenology, pulsars as probes of the interstellar medium and timing irregularities in young pulsars. It also includes a catalog of the parameters of over 700 pulsars.

The book is not perfect. The first edition was marred by numerous typographical errors; a surprising number remain, and some new ones have been added. For example in both editions, one of the tables incorrectly states the position of the relativistic binary pulsar, but a new error in the measurement uncertainty appears in the new edition. One equation I looked up (17.16) was dimensionally incorrect in the first edition. It is also dimensionally incorrect in the new edition, but in a different way. There are also some potentially confusing inconsistencies. For example, in one section, the lack of contemporary observations of the supernova in Cassiopeia around the

year 1700 is said to be naturally explained by the high optical obscuration in that direction; in another it is taken to imply that the supernova was very subliminous. Curiously, in a third spot the authors use a possible 1680 observation of the same supernova by John Flamsteed in an argument about the remnant's expansion velocity.

I was also disappointed that the authors missed numerous opportunities to bring their older material up to date. Their discussion of relativistic binaries, the subject of the 1993 Nobel Prize in Physics to Russell A. Hulse and Joseph H. Taylor Jr, is still based on data taken before 1982. They have added a note about the desirability of discovering a binary that is edge-on to the observer's line of sight, but they neglect the extensive work published on two such systems since 1990. The discussion of supernovae has been partially updated in recognition of the modern subdivision of hydrogen-poor events into types Ia and Ib, but the subdivision is not explained, despite the probable importance of type Ib events in the formation of binary pulsars. This section needs a rewrite, not the light gloss it received.

There are other problems that limit the usefulness of the book as a reference work. The index is inadequate, with few individual sources listed. Observational results are usually well referenced (for example, the short paragraph on pulsar B0540-69 has five citations), but theoretical results often are unreferenced (as in the sections on x-ray binaries) or have only historical references, without pointers to the recent literature.

Despite these limitations, *Pulsar Astronomy* remains what reviewer Thomas Gold called "the most complete overview of the pulsar field yet published" (PHYSICS TODAY, August 1991, page 63). With its breadth and clear presentation, the new edition will continue to be a valuable introduction for graduate students and others, who might then move on to the excellent collection of review papers, *Pulsars as Physics Laboratories* (edited by Roger Blandford, et al., Oxford, 1993) for a more advanced overview.

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