incarnation is due mainly to the work of Brandon Carter and Robert Dicke, and this book, written by two well-known cosmologists, is an attempt to summarize both their history and the evidence in support of them. The erudition displayed here is simply awesome, and it is difficult indeed to imagine a topic that touches, however tangentially, on these principles that has been omitted. That said, I found that too many of the discussions lacked sufficient detail to allow the general reader, or even the specialist, to follow the argument—too much has to be taken on faith. While, for example, the chapter on cosmology abounds with formulas, very few are actually derived and many of the order-of-magnitude arguments left me unconvinced. One longs for the deductive approach one finds for example in Steven Weinberg's *Gravitation and Cosmology*. In fairness to the authors I should say that they do cite references in support of each of their assertions. But without access to a large scientific library the reader will have difficulty tracking them down (some have not been published in standard journals). And I fear that most of the references will be beyond comprehension except to specialists. Finally, I found the presentation relentless. There was no space, no doubts. The reader is simply overwhelmed in the end, but not necessarily convinced.

One of the main objections to the necessary version of the anthropic principle is that it does not satisfy Karl Popper's requirement of falsifiability. To refute this claim the authors offer the Carter inequality, which connects the number of improbable steps in the evolution of the species *Homo sapiens* and the length of time the Earth will remain a habitable planet. I could not follow the derivation given in the book. But worse, the estimates of the number of improbable steps range from about 10, which gives an upper limit of 4.5×10^8 years for the length of time the biosphere can continue into the future, to more than 110 000, giving an upper limit of 4.1×10^4 years for this time. Strangely, this latter estimate is based on a probabilistic calculation of the odds of assembling a single gene that does not take into account the enormous reduction in these odds when one includes the solar energy input into the system where this assemblage presumably took place. In any case it is not a prediction that most of us will be able to check. Furthermore, no mechanism for the demise of the biosphere is suggested by the derivation, so the lengthy discussion of such mechanisms that follows it seems irrelevant.

Finally I must say a few words about the sufficient version of the anthropic principle. One of the major goals of this book apparently is to impress the reader with the improbable fine tuning of the laws of nature that is necessary for our existence. We are told, for example, that "if the relative strengths of the nuclear and electromagnetic forces were to be slightly different then carbon atoms could not exist in nature and human physicists could not have evolved." And indeed, one cannot help but be impressed with the large number of such fine tunings that seem to be required for our existence. But does this mean that they are sufficient for this existence? One cannot help but conclude that the main purpose of this book is to argue for such a teleological interpretation as the only way to understand this fine tuning. This is a fascinating question but in my opinion not—despite the authors' claims to the contrary—part of the discourse of contemporary science.

James L. Anderson
Stevens Institute of Technology

Physics of Dense Matter

Y. C. Leung
268 pp. World Scientific, Singapore (Teaneck, N. J.), 1985.
ISBN 9971-978-10-5. $47.00

Supernova 1987a is a timely reminder of the rich and fascinating physics of dense matter and its role in supernovae and neutron stars. Few problems have such fundamental appeal and involve such a rich blend of nuclear physics, particle physics, astrophysics and condensed matter physics.

One essential ingredient for understanding supernovae and neutron stars is the equation of state of equilibrated matter. Y. C. Leung has written a clear, pedagogical introduction to our present understanding of the equation of state of condensed matter from terrestrial densities to beyond the densities found within nuclei. Leung assumes no prior or specialized background and his thorough and detailed treatment is easily accessible to an advanced undergraduate student or beginning graduate student with a knowledge of quantum mechanics. Particularly valuable is his treatment of the regime up to nuclear density, for which the relevant approximations have been tested quantitatively in experiments on atomic nuclei. In no other place, to my knowledge, can a student find collected so conveniently all the relevant ingredients of many-body physics, atomic physics and nuclear physics: the Thomas–Fermi, Hartree–Fock and thermal Hartree–Fock approximations; a review of nuclear interactions; and the independent-pair and variational treatments of nuclear matter. From these ingredients, Leung provides a quantitative description of how matter progresses from the low-density state, consisting of isolated nuclei; through the region of subnuclear densities, in which the high Fermi energy of electrons results in increasingly neutron-rich nuclei and eventually forces neutrons out of nuclei; and to the emergence of a uniform quantum liquid at nuclear density. The last section of the book treats the more controversial region above the density of nuclear matter, providing a brief survey of meson–nucleon field theory, pion condensation and quark matter. In contrast to earlier sections, the treatment of these topics is not self-contained, and serves only as an introduction. Numerical tables of the calculated equation of state are provided in an appendix, a thoughtful convenience for those who wish to use the equation of state in astrophysical calculations.

If the book has any fault, it is that treating so rich a topic in 268 pages necessarily leaves much unsaid. Conspicuously absent is discussion of superfluidity and the associated pinning of vortices to nuclei in the neutron drip regime, which are important for understanding pulsar glitches. There is no discussion of strange matter nor of the possibility that it is in fact the true ground state of matter. The few experimental facts that constrain the equation of state—such as the compression modulus obtained from giant monopole resonances, and the limits placed by the measured masses of neutron stars—are not mentioned. These omissions are consistent with the fact that the most recent references cited are from 1982. Clearly, Leung has chosen to focus his book on older aspects of dense matter physics that are reasonably well understood. For readers who seek a clear, readable presentation of this physics, and are not put off by photoreproduction of a typewritten manuscript in the era of computer-driven laser printers, this book is an excellent reference.

John W. Negele
Center for Theoretical Physics, MIT

Applied Classical Electrodynamics

Frederic A. Hopf and George I. A. Stegeman
Volume 1: Linear Optics
262 pp. Wiley, New York, 1985.
ISBN 0-471-82788-6. $29.95
Volume 2: Nonlinear Optics
182 pp. Wiley, New York, 1986.
ISBN 0-471-82787-8. $27.50

The two volume set *Applied Classical Electrodynamics*, by Frederic Hopf and