

neutrinos with masses and mixings. A minor drawback is the omission of the Gallium and Reactor anomalies, which, in my opinion, are on the same footing as the LSND and MiniBooNE ones.

Although *The Physics of Neutrinos* is not intended as a textbook, it may be of interest as a guide for graduate students who want to enter the field. For a graduate text, I recommend Rabindra Mohapatra and Palash Pal's *Massive Neutrinos in Physics and Astrophysics* (3rd edition, World Scientific, 2004), which is more pedagogical and discusses some theoretical issues—in particular, models of neutrino mass—in greater detail. However, the Mohapatra and Pal book lacks the comprehensive experimental summary provided by Barger, Marfatia, and Whisnant; in that regard, the two books are complementary reads.

Anyone curious about the dramatic progress made in this pivotal area of particle physics would benefit from reading the introduction's brief historical review, which notes many of the early achievements that have led us to where we are today. In my opinion, though, *The Physics of Neutrinos* should prove especially valuable to particle physicists, nuclear physicists, cosmolo-

gists, and astrophysicists who want to learn about the field. Neutrino researchers will certainly want to have it as a reference on their bookshelves.

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A Course in Theoretical Physics

P. J. Shepherd
Wiley, 2013. \$160.00 (465 pp.).
ISBN 978-1-118-48134-9

P. J. Shepherd, author of *A Course in Theoretical Physics*, has been teaching at the UK's Exeter University for more than 30 years. Shepherd sets out to provide full mathematical derivations for the theoretical topics covered in the latter years of a typical undergraduate major. He divides the book into five modules: nonrelativistic quantum mechanics, thermal and statistical physics, many-body theory, classical field theory and relativity, and relativistic quantum mechanics and gauge theories.

Some of the advanced topics—for example, the Bardeen-Cooper-Schrieffer

theory (chapter 16) and the basic standard model of high-energy physics (chapter 20)—may be attractive to advanced students and to experimenters as a desk reference. Even for senior academic physicists, the text can be useful either as a teaching aid or as a back-to-basics reference.

Compared with standard field-specific textbooks, the modules are rather small, about 90 pages each. Still, Shepherd addresses the crucial central concepts and provides enough detail in the derivations that students should be able to follow. The compact, thorough treatment makes the book rather unlike the many available textbooks on the subjects covered in the modules.

I was, however, disappointed by the lack of intuitive physical insights that would have helped to motivate and elaborate many of the concepts addressed. For instance, when obtaining the solution of the Schrödinger equation in a spherically symmetric potential, Shepherd eschews a discussion of the simplifications that can be deduced by appealing to the underlying symmetry. Rather, he jumps right in with a trial solution in which angular and radial variables are separated. Also,



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the scattering presentation in chapter 4 does not elaborate on important aspects of the potential, such as its range.

The section on temperature scales in chapter 5 is too detailed. Moreover, it involves the triple point, which is explained in detail only much later, in chapter 11. The advanced material in the last two modules goes at a pace that only an expert can follow. Perhaps the ambition to cover all the material in a short book necessitated the rapid pace of those final modules.

I appreciate *A Course in Theoretical Physics* for what it offers. Like a good classroom lecture, it provides a step-by-step understanding of the topics. Thus, it may capture the market segment of books that focus on vividly elucidating the underlying concepts. Although that feature may have particular appeal to students, for a typical course, it's more suitable as a supplement than as a primary textbook.

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