equations. Fortunately, logarithms are used only once and partial differential equations not at all.

Generally, the nature of the reasoning is brought out more clearly than is the content, even where a few additional words could give the reader a simple picture. For example, it would take only a sentence or two to explain how the photoelectric effect support the hypothesis of light quanta. The book says only: "Einstein . . . had invented the concept of light quanta or *photons*, an idea that, among other things, explained the photoelectric effect."

Similarly, in getting across the counter-intuitive idea that the relative timing of a distant event may appear different to different observers, it would surely help in explaining relativity to illustrate the impossibility of comparing times at distant places.

All these points concern presentation; overall the author has given a good account of how the physicist reasons. I do, however, disagree with his description of the "arrow of time," in which he fails to take into account the fact that, in most problems, we specify initial but not terminal conditions.

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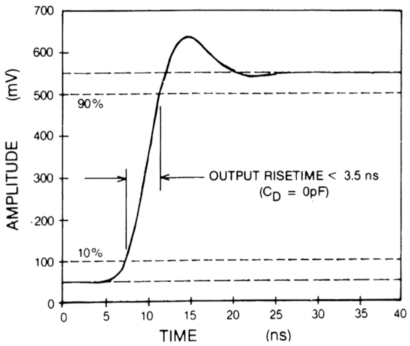
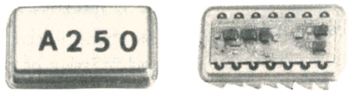
Simple Models of Complex Nuclei: The Shell Model and Interacting Boson Model

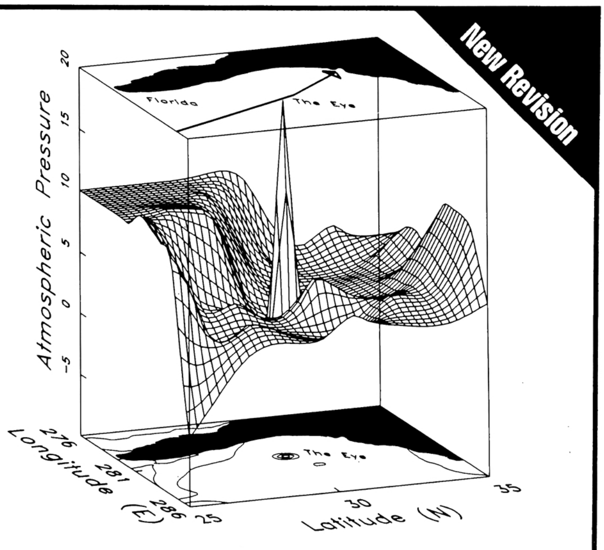
Igal Talmi
Harwood Academic, Chur, Switzerland, 1993. 1074 pp. $125.00 hc
ISBN 03-7186-0551-1

The physics community enthusiastically welcomed the publication of *Nuclear Shell Theory* by Amos de-Shalit and Igal Talmi in 1963. Talmi, one of the pioneers of the nuclear shell model, has now expanded upon this original effort in *Simple Models of Complex Nuclei*, which focuses on the nuclear shell model and the interacting boson model.

This volume is part of the Contemporary Concepts in Physics series (Volume 7), whose purpose is to provide technical books on forefront subjects of current research that are rigorous and complete enough to be directly useful to both professional physicists and serious physics graduate students. In this regard the pre-







sent volume is a total success, because the author was given free rein to cover his subject matter in extensive detail. Consequently, the reader can easily follow all the arguments and derivations, which makes the book ideally suited for self-study. This approach, however, contributed to the great length of the volume—almost 1100 pages—which is too long for a standard course textbook.

This new volume is certainly a worthy successor to the original. All the mechanics of the shell model are here, including Racah algebra, the transformation for the harmonic oscillator Hamiltonian from two-particle to relative center-of-mass coordinates, coefficients of fractional parentage and seniority, along with much new material on second quantization and group theory. There are extensive sections on topics to which the author has been a major contributor, such as seniority and generalized seniority.

The work on generalized seniority provided a natural bridge for Talmi to the interacting boson model, hence the new chapters on this model, its applications and microscopic interpretation. All material is given in sufficient detail to direct the nonexpert reader beyond superficial facts. The thorough coverage of each topic should allow the more advanced reader to skip known material and proceed to individual sections that are unfamiliar.

Talmi's special perspective and philosophy about nuclear physics permeate the book and add insight to his subject. Although he is a theorist, Talmi considers nuclear physics to be rooted in the experimental data, which should always take priority over mathematical formulas no matter how elegant and attractive the formulas may be. The results of complex calculations cannot be trusted quantitatively, and the success of the assumptions of any nuclear model is justified only by their agreement with experimental data.

The book ends with an excellent 107-page appendix, containing all the principal formulas, relationships and tables of coefficients. The bibliography is short for a book of this size. (Even the author comments on this fact in the preface.) This is a minor drawback, however, for a work of this magnitude.

One can only hope that Talmi's fine book will receive the same consideration and interest as its predecessor.

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Quantum Field Theory

Lowell S. Brown
Cambridge U. P., New York, 1992. 542 pp. $100.00 hc
ISBN 0-521-400-066

Quantum Field Theory: A Modern Introduction

Michio Kaku
Oxford U. P., New York, 1993. 785 pp. $49.95 hc
ISBN 0-19-507652-4

Quantum field theory was introduced by Paul Dirac, Werner Heisenberg and Wolfgang Pauli in the late 1920s, surprisingly soon after the birth of quantum theory. It is a generalization of quantum theory that allows