recover the Feynman diagrams for ϕ^4 theory. He also discusses fermion path integrals and includes, in the ensuing discussion of the quantization of Yang–Mills fields, the Fadeev–Popov determinant and ghosts. He explains the origin and physical meaning of θ worlds especially clearly.

The book covers a number of important and advanced topics in field theory in a traditional manner. These include the Callan–Symanzik equation and the renormalization group (including a review of renormalization *per se*), spontaneous symmetry breaking and the effective potential, dimensional transmutation, and the axial anomaly.

The book's last chapter is a discussion of quantum chromodynamics that is much less technical than most of the rest. It briefly covers the color and flavor groups and presents important results for which the body of the book had provided the mathematical background. Whereas most of the book is devoted to developing methods, this chapter pulls together results (from earlier chapters or the literature) as they apply to chromodynamics.

The book's most serious limitation is the absence of any material on lattice QCD. There is no discussion of numerical techniques or results, of confinement nor of the hadron spectrum.

It is easy to use the book for learning separate subjects. Most chapters are self-contained and use standard notation, so they can almost be read in any order and an individual topic can be studied alone, surely a virtue for many prospective readers, and a pleasant contrast with many other texts.

Huang has written quite a useful book. It is a slim volume, but the material in it is very well chosen. It covers the core analytic field-theoretic material of the standard model in a clear concise manner.

JEFFREY E. MANDULA
Washington University

Quantum Field Theory

C. Itzykson and J.-B. Zuber
705 pp. McGraw-Hill, 1980. $55.00

Until four years ago, when this book first appeared, there was no textbook that presented a coherent and comprehensive account of quantum field theory from the basics through to the developments of the 1960s and 1970s. Those of us who had the task of introducing graduate students to the subject had to rely for background reading on the older classics, such as the two volumes by James Bjorken and Sidney Drell, supplemented by reviews of specialized topics. The arrival of a more comprehensive treatment was thus extremely welcome. Since that time, several other books have been

published which are similar in objective, but none has rivaled the one by Itzykson and Zuber for comprehensiveness.

From a pedagogical point of view, the book's comprehensiveness is perhaps a disadvantage—at least for the student approaching quantum field theory for the first time. The style is very learned and, right from the beginning, the approach is angled towards the treatment of non-Abelian gauge theories. I personally prefer to take students through to low-order Feynman diagram calculations in simple models (ϕ^4 and QED) by as straightforward a route as possible before adopting the more sophisticated approach to field theory needed for the more fancy models. My teaching experience (which includes trying this book out on my graduate students) leads me to believe that Itzykson and Zuber have written the textbook on quantum field theory which everyone should read second, but not first!

Lest my comments so far seem a little negative, let me conclude by saying that the book is now an invaluable part of my library. Not only is the coverage of the text itself comprehensive, but the bibliographic notes at the end of each chapter provide some historical perspective as well as references for details not covered in the text. I recommend it strongly to all but the novice.

PETER HIGGS
University of Edinburgh

new books

Optics and Acoustics

Physical Detectors of Optical Radiation. *Optical Radiation Measurements.* Vol. 4. W. Budde. 326 pp. Academic, New York, 1984. $49.50. *monograph*

New Directions in Guided Wave and Coherent Optics. 2 Vols. *NATO Advanced Science Institutes Series.* Edited by D. B. Ostrowsky and E. Spitz, 685 pp. Martinus Nijhoff, Boston, 1984. $95.00.

Atomic, Molecular and Chemical Physics

Applied Charged Particle Optics. *Advances in Electronics and Electron Physics.* Part C. Very-High-Density Beams. A. Septier, ed. 545 pp. Academic, New York, 1984. $74.50

Advances in Atomic and Molecular Physics. Vol. 19. D. Bates, B. Bederson, eds. 465 pp. Academic, New York, 1984. $85.00. *Compendium*

Room Temperature Phosphorimetry for Chemical Analysis. T. Vo-Dinh. 304 pp. Wiley, New York, 1984. $50.00. *monograph*

Multiphoton Spectroscopy of Molecules. S. H. Lin, Y. Fujimura, H. J. Neusser, E. W. Schlag. 260 pp. Academic, New York, 1984. $59.00. *monograph*

The quantum theory of unimolecular reactions, H. O. Pritchard, 175pp. Cambridge U.P., Cambridge, 1984. $49.50. *monograph*

Inert Gases. *Springer Series in Chemical Physics 34.* M. L. Klein, ed. 266 pp. Springer-Verlag, New York, 1984. $29.00

Liquid Crystal Polymers I. *Advances in Polymer Science 59.* M. Gorder, ed. 158 pp Springer Verlag, New York, 1984. $39.00

Molecular Diffusion and Spectra. William T. Coffey, Myron W. Evans, Paolo Grigolini. 378 pp. Wiley-Interscience, New York, 1984. $49.95

Application of Transition State Theory to Unimolecular Reactions: An Introduction, J. H. Beynon, J. R. Gilbert. 85 pp. Wiley-Interscience, New York, 1984.

Quantum Chemistry. Third Edition. Ira N. Levine. 566 pp. Allyn and Bacon, Boston, 1984. *undergraduate text*