not done properly because of the use of internet search engines whose information reaches only to the predawn of the 1960s.

I would, however, be remiss not to discuss the book's shortcomings. For one, the publisher should have provided a biographical overview of the author to intimate to readers Gilman's professional qualifications. In addition, few recent references, except those of the author, are provided. Although typeset using LaTeX, the book's many equations are difficult to read. Improved editing is needed in several instances; for example, in chapter 4, elastic coefficients and ratios are introduced with terse descriptions that would benefit from a figure, but the figure does not appear until chapter 13. Also, the variable δ is used multiple times for different things. Oddly enough, the book just ends: No summary exists to tie discussions together. Finally, electronic-structure methods have recently addressed the strength of materials, such as ideal shear strength, and researchers are using those methods to help relate strength to structure defects and electronic properties, including changes in bonding topology. Because such issues are addressed in the book, it would have been worthwhile for Gilman to have made some connection to electronic-structure methods—especially because those methods will eventually affect mechanical modeling.

Because solids are, by nature, complex, Gilman offers a view that it is better to make approximations first—sometimes drastic ones—and provide simple calculations that are consistent with the rules of quantum mechanics and still yield properties in agreement with observation. In fact, Gilman uses only basic stress–strain relations, elasticity theory, Coulomb's law, the Heisenberg uncertainty principle, and simple quantum mechanics. All the concepts are presented in the initial eight chapters concisely (sometimes too much so) and with undergraduate-level mathematics. Hence the book should be accessible to advanced undergraduate students. Even so, I am dubious whether Gilman's book would, as the publisher claims, serve well as a supplementary text for teaching solid mechanics—that is, unless students have a good background in quantum mechanics and solid-state physics.

Nonetheless, whether intended for students trying to understand the basic origin of trends in strength of materials or for veteran researchers searching for a broader perspective, Gilman's book offers a one-of-a-kind contribution based on his lifetime of scholarship and his unique point of view. His contribution is our gain, and, for those interested in the field, *Electronic Basis of the Strength of Materials* is a worthy read.

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Quantum Chromodynamics: High Energy Experiments and Theory

Günther Dissertori, Ian Knowles, and Michael Schmelling
Oxford U. Press, New York, 2003. $120.00 (538 pp.). ISBN 0-19-850572-8

Quantum chromodynamics is the widely accepted theory of the strong interactions that bind quarks into nucleons and nucleons into nuclei. Much like the standard model of electromagnetic and weak interactions, QCD is a quantum field theory (QFT) for massless vector particles whose dynamics is governed by a Lagrangian that is invariant under a non-abelian gauge symmetry. QCD exhibits behavior that makes it an unquestionable success in describing nature's strong force; but unlike the theory of electroweak interactions, it is a remarkably difficult theory from which to make predictions.

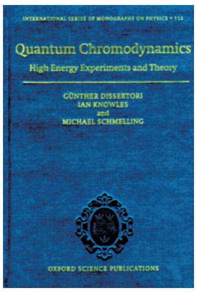
Nevertheless, 30 years after its inception, QCD has become a mature theory. Research in the field has evolved from, at the early stages, basic understanding and confirmation of the theory, to the development of tools for precise tests of the theory and accurate determination of its parameters, and finally to a standard ingredient necessary for interpretation of experiments, particularly in the search for new phenomena.

This is not to say there are no open questions left in QCD. Some of the deepest issues, such as the permanent confinement of quarks in hadrons, remain unexplained from first principles. Rather, in the realm of very high-energy collisions, the theory has evolved to the point that it plays the role of "engineering physics," thus allowing us to interpret unequivocally the output of collider experiments designed to search for new fundamental forces and particles. Graduate students and other newcomers to the field face a monumental task in learning both experimental and theoretical aspects of QCD. Traditionally, the source of their learning has been a combination of texts and review articles that mostly discuss either the theory or experimental aspects of the strong interactions and frequently only offer a restricted selection of topics.

Quantum Chromodynamics: High Energy Experiments and Theory is the first monograph that comprehensively addresses both aspects of QCD in one place. The first two chapters of the text contain preliminaries. Chapter 3 is devoted to theory; chapters 5–13, experiment. However, because the theory and many advanced applications are developed in an earlier chapter of the book, those on experiment freely invoke sophisticated results from theory. With its combination of topics, this book, in principle, ought to be a good resource for graduate students interested in QCD theory or experiment, and the book is intended for that audience. In fact, given its comprehensive nature, this monograph ought to be a good reference volume for practitioners, too.

The prerequisite for reading the book is a working knowledge of relativistic QFT. Regrettably, the quality of the presentation of theory is subpar. The problem is not just the presence of mistakes, both conceptual and algebraic. The authors' presentation all too often fails to explain the underlying physics and methodology, and arguments are often poorly justified, if at all. A number of other excellent texts on QFT cover many—but not all—of the QCD theory topics that are in this monograph. For example, Michael E. Peskin and Daniel V. Schroeder's *An Introduction to Quantum Field Theory* (Addison Wesley, 1995) beautifully succeeds in explaining asymptotic freedom, IR divergences, and parton evolution.

On the bright side, the discussions in *Quantum Chromodynamics* on experiment and Monte Carlo models are well written and pedagogic, which is



perhaps expected because the authors are renowned experts in experimental particle physics. And one of them, Knowles, is an expert on Monte Carlo models. Although two chapters concisely describe the experimental setup, the extended discussion is not focused on the technology of particle accelerators and many-component detectors for colliders but, rather, on the analysis and interpretation of experimental results. In describing the modern experimental tests of QCD, the authors collect, analyze, and very effectively present results from every possible source. For these reasons, the monograph is a valuable resource.

I recommend *Quantum Chromodynamics* to practitioners of QCD for its discussion of experiments. But I would direct graduate students to alternative sources for a presentation of QCD theory before consulting this book.

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New Books

History and Philosophy

Mind, Matter and Quantum Mechanics. 2nd ed. H. P. Stapp. *The Frontiers Collection*. Springer-Verlag, New York, 2004 [1993]. $49.95 (297 pp.). ISBN 3-540-40761-8

Physics and Whitehead: Quantum, Process, and Experience. T. E. Eastman, H. Keeton, eds. *SUNY Series in Constructive Postmodern Thought*. SUNY Press, Albany, NY, 2004. $55.00 (322. pp.). ISBN 0-7914-5913-6

Rocket Dreams: How the Space Age Shaped Our Vision of a World Beyond. M. Benjamin. Free Press, New York, 2003. $24.00, $14.00 *paper* (242 pp.). ISBN 0-7432-3343-3, ISBN 0-7432-5534-8 *paper*

Sneaking a Look at God's Cards: Unraveling the Mysteries of Quantum Mechanics. G. Ghirardi (translated from Italian by G. Malsbary). Princeton U. Press, Princeton, NJ, 2004. $35.00 (488 pp.). ISBN 0-691-04934-3

Symmetries in Physics: Philosophical Reflections. K. Brading, E. Castellani, eds. Cambridge U. Press, New York, 2003. $100.00 (445 pp.). ISBN 0-521-82137-1

When Least is Best: How Mathematicians Discovered Many Clever Ways to Make Things as Small (or as Large) as Possible. P. J. Nahin. Princeton U. Press, Princeton, NJ, 2004. $29.95 (370 pp.). ISBN 0-691-07078-4

Instrumentation and Techniques

Beam Halo Dynamics, Diagnostics, and Collimation. J. Wei, W. Fischer, P. Manning, eds. *AIP Conference Proceedings 693*. Proc. wksp., Long Island, NY, May 2003. AIP, Melville, NY, 2003. $150.00 (317 pp.). ISBN 0-7354-0166-7, *CD-ROM*

Handbook of Modern Sensors: Physics, Designs, and Applications. 3rd ed. J. Fraden. AIP Press/Springer-Verlag, New York, 2004 [1996]. $89.95 (589 pp.). ISBN 0-387-00750-4

High Magnetic Fields: Science and Technology. Vol. 1: Magnet Technology and Experimental Techniques. F. Herlach, N. Miura, eds. World Scientific, River Edge, NJ, 2003. $46.00 (326 pp.). ISBN 981-02-4964-0

High Magnetic Fields: Science and Technology. Vol. 2: Theory and Experiments 1. F. Herlach, N. Miura, eds. World Scientific, River Edge, NJ, 2003. $46.00 (271 pp.). ISBN 981-02-4965-9

Laser Safety. R. Henderson, K. Schulmeister. IOP, Philadelphia, 2004. $99.00 (459 pp.). ISBN 0-7503-0859-1

Scanning Tunneling Microscopy/Spectroscopy and Related Techniques. P. M. Koenraad, M. Kemerink, eds. *AIP Conference Proceedings 696*. Proc. conf., Eindhoven, the Netherlands, July 2003. AIP, Melville, NY, 2003. $155.00 (179 pp.). ISBN 0-7354-0168-3, *CD-ROM*

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Anomalous X-ray Diffraction From Semiconductor Nanostructure. T. U. Schülli. *Series C: Technology and Natural Sciences 40*. Trauner, Linz, Austria, 2003. €18.50 *paper* (144 pp.). ISBN 3-85487-512-6

Epitaxy of Nanostructures. V. A. Shchukin, N. N. Ledentsov, D. Bimberg. *Nanoscience and Technology*. Springer-Verlag, New York, 2004. $109.00 (387 pp.). ISBN 3-540-67817-4

Fibers and Composites. P. Delhaès, ed. *World of Carbon*. Taylor & Francis, New