insularity and scientific stasis on China. I am persuaded that the power of our literary intellectuals, exercised through their students, is comparable to that of the Chinese intellectual bureaucracy and their all important student.

We should be thankful that Gross and Levitt have provided a wake-up call. Their significant overview of the thinking of those who teach our lawyers, journalists and teachers should be read by all who are concerned by the decline of the status of science in our times.

Order, Chaos, Order: The Transition from Classical to Quantum Physics

Philip Stehle
Oxford U. P., New York, 1994. 332 pp. $59.95 hc
ISBN 0-19-507513-7

In the history of science, two approaches have long persisted to create tension in the field. The last generation has witnessed the increasing popularity of "external" histories, written largely by professional historians of science and emphasizing the interaction between science and society. But these works have not displaced the more traditional, "internal" narratives, mostly written by scientists themselves and focusing on the technical evolution of science from one discovery to another. Despite its catchy title and the dust jacket's assurance of its being "accessible to nonscientist general readers," *Order, Chaos, Order* represents a rather extreme example of an internal history, with both its strengths and weaknesses.

In the introduction, Philip Stehle, emeritus professor of physics at the University of Pittsburgh and author of several physics texts, makes it clear that his interest "lies more in the evolution and interplay of ideas than in the personalities of the participants." Closely following the original events and publications, he surveys the structure of classical physics as it evolved to the end of the 19th century, its various difficulties, new experimental discoveries and the emergence of quantum theory and relativity in their wake. The account covers mainly the period from 1895 to 1925, with a brief last chapter on the new quantum mechanics. General relativity is not discussed. On each major topic, the author carefully reconstructs both the prevailing theories and their context, often with thoughtful comments on the connections between various physical concepts.

While specialists will probably find little that is new here, *Order, Chaos, Order* provides a reliable guide to the original literature of the scientific revolution in physics at the turn of the century. The clear presentation should also make it a valuable addition to courses in either physics or physics history. The book reads at times like a physics textbook. The language is plain, but the material is dense. There is a fair amount of mathematics in the text, and there is much more in the exercise-like "amplification" pieces scattered throughout the book.

The strictly internal approach to science history, however, has its shortcomings. Although the book presents a good picture of what physicists did in physics, one learns little about how they did it, much less why. There is no mention, for example, of the profound influence of the philosophies of Baruch Spinoza, David Hume and Ernst Mach in the evolution of Albert Einstein's scientific thinking. Given the minimal reference to secondary sources in the text, the short list of suggested readings at the end of the book hardly serves as an adequate introduction to the large extant body of historical scholarship on the subject.

Order, Chaos, Order was obviously a labor of love and will interest historically inclined physicists. If supplemented by other more "externally" oriented texts, it will also be useful for an undergraduate course in the history of physics, for which Stehle prepared the book in the first place.

ZUOYUE WANG
University of Calfornia, Santa Barbara

From Alchemy to Quarks

Sheldon Glashow
Brooks-Cole, Pacific Grove, Calif., 1994. 692 pp. $60.75 hc
ISBN 0-534-16656-3

Since 1979 Sheldon Glashow has been teaching an undergraduate course for nonscience majors at Harvard College based on the material in this book, which he subtitles "The Study of Physics as a Liberal Art." The writing of such a book follows a long-established practice by Eric Rogers, Gerald Holton, Robert March, Steven Weinberg, Leon Lederman and others who have taught—and written physics texts for—nonscience college students interested in satisfying core dis-

tribution requirements in science.

In this genre of physics text, the level of mathematical and physical sophistication varies considerably from one book to another, presumably reflecting the range of student interests and preparation. Another consideration clearly has been the variety of goals set by individual institutions and authors for such courses. Should the course be a miniature version of a traditional physics course? Should it inform students of what it is that physicists do and how they think? Should it select highlights from the great ideas and lives of the great scientists? Or should it try to make students scientifically literate citizens eager to participate in the debates of the body politic and able to read science articles in popular magazines or newspapers?

Glashow clearly intends his book to be at a high level, unapologetic in its challenge to the student and as rigorous as comparable humanities and social sciences texts. He undertakes an enormous task: to review the history, ideas and methods of physics, on both intuitive and sophisticated mathematical levels, from ancient Greek science to the standard model. This is clearly a labor of love, and Glashow has devised many thoughtful examples, back-of-the-envelope calculations and problem sets, and he has included many personal insights, all of which make this book very attractive indeed. He has packed into a volume of some 700 pages all the important topics in physics, from the gas laws and planetary motion to electricity and magnetism, relativity and modern particle physics, as well as some chemistry (in his discussion of the periodic table of elements in chapter 6). I found particularly appealing the material (in chapters 9 to 11) dealing with waves, atomic physics and the rise of quantum theory.

When considering this text in a core program, however, one should take note of its mathematics level. In chapter 3, on energy and momentum, Glashow goes through—in detail—elastic and inelastic collisions in one dimension, vector cross product and then, in vector notation, motion in three dimensions. In chapter 11, we are given a discussion of atomic shell structure, including *s*, *p*, *d* and *f* electron states. In chapter 12 the author does a detailed calculation of relativistic energy and relativistic collisions and presents an elementary derivation of the Compton effect. For students whose high school preparation is strong, this may be an excellent way to present such material, but the level of the book is so high and challenging

PLACEMENT CENTER

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- The primary purpose of the Center is to arrange personal interviews between physicists seeking employment and prospective employers. Interviews will be arranged between employers' representatives and applicants registered for the meeting who have also registered with the Placement Service.

- Universities, colleges, research institutions, industrial organizations and government laboratories are invited to participate in the Placement Center and conduct interviews with physicists attending the meeting. A complete register of physicists seeking employment will be available at a nominal service charge upon request at the meeting and after the meeting.

- Information and meeting applications for registering for the Placement Center may be obtained by writing to the Institute's office. The deadline for being included in the Center is 4 March 1995.

CAREER PLANNING AND PLACEMENT
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that one might consider using it as an introductory text in a regular one-semester physics course for majors.

The complaint of many physics students is that we spend too much time teaching the physics of the 19th century; Glashow's book is firmly rooted in the 20th. It should be on every physicist's bookshelf, especially teachers of core college curricula. Acceptance as a text will very much depend on the level of student preparation and the culture on the individual campus.

ISAAC D. ABELLA
University of Chicago

Introduction to Surface Chemistry and Catalysis

Gabor A. Somorjai
Wiley, New York, 1994.
667 pp. $59.95 hc
ISBN 0-471-03192-5

With the explosive development of techniques for atomic-level scrutiny of surfaces and interfaces over the past quarter-century, modern surface science has come of age. Yet it is only recently that the full power of the field has been brought to bear on the definition and development of surface chemistry. Until now, a text that provides the necessary technological, conceptual and fundamental introduction to surface chemistry and its importance in fields such as heterogeneous catalysis has been sorely needed. But with the publication of *Introduction to Surface Chemistry and Catalysis*, much of this void is filled.

In this text, Gabor Somorjai, a pioneer in surface chemistry, provides an authoritative account of the discipline. Somorjai presents, in a lucid and readable style, the underlying principles of surface chemistry together with an overview of our current understanding of the structure, thermodynamics, dynamics, electrical properties and bonding of clean surfaces and adsorbed monolayers. The text also includes important case histories (many from the author's laboratory) of the contributions of surface science to heterogeneous catalysis and tribology.

Introduction to Surface Chemistry and Catalysis achieves the difficult objective of combining perspective on the state of the art with pedagogy on the fundamentals of the discipline. The text updates and combines many of the features of Somorjai's two earlier books on the subject: *Principles of Surface Chemistry* (Prentice-Hall, 1972) and *Chemistry in Two-Dimensions: Surfaces* (Cornell, 1981). While it does not supplant topical monographs, such as those in the Springer Series in Surface Science, or more specialized books, such as those focusing on surface analysis techniques, it is the definitive, comprehensive text on modern surface chemistry. It is an ideal book for advanced undergraduate and introductory graduate courses and will be an important reference for specialists in the field. Parts of the text are even suitable for general chemistry.

The book achieves these diverse objectives by combining a textbook format with clear writing, intuitive insights and summary statements supported by well-tabulated data from the literature. For the beginning student, each chapter begins with a conceptual overview and concludes with a list of key concepts. Problems given within each chapter range from illustrative examples of theoretical concepts to extensions of the textual material via references to work in the literature. Detailed, informative solutions for all but the most open-ended assignments are given at the back of the book.

More advanced students and active researchers will appreciate the extensive references (article titles are included) and the numerous literature results summarized in tables and figures. Particularly notable is a comprehensive (more-than-100-page) tabulation of the two-dimensional ordered structures reported in the literature for clean solid surfaces and adsorbed monolayers. The tabulation, which is subdivided according to substrate (metal, semiconductor, insulator), adsorbate (atomic, molecular), surface geometry and overlayer symmetry, includes more than 2400 references, is comprehensive through 1986 and contains selected citations through 1992. This tabulation is a remarkable resource not only for specific surface structures and general trends but also as a useful first source to determine which surface–adsorbate systems have been previously studied and by whom. A welcome addition for newcomers to the field is a well-referenced table that summarizes concisely the acronyms, names, principles and uses of over 50 of the most common techniques of surface analysis.

Introduction to Surface Chemistry and Catalysis will be a classic text and should see wide application both within and beyond surface chemistry.

BRIAN E. BENT
Columbia University
New York, New York

G. I. Budker: Reflections and Remembrances

Edited by Boris N. Breizman and James W. van Dam
AIP, New York, 1994. 364 pp.
$45.00 hc ISBN 1-56396-070-2

G. I. Budker: Reflections and Remembrances is a book about a man who was both a genius in physics and a fascinating personality. In it, prominent physicists such as Wolfgang K. H. Panofsky, Yakov B. Zel'dovich, Arkady B. Migdal, Lev B. Okun, Spartak T. Belyaev, Alexander N. Skrinsky, Boris V. Chirikov, Roald Z. Sagdeev, Norman Rostoker, Dmitri D. Rytov and others share with readers their reminiscences of Gersh Budker's work and life. Selected popular essays by Budker open the book, which originated as a 1988 memorial volume, edited by Skrinsky and published in Russian 11 years after Budker's death to mark the 70th anniversary of his birth. New material has been added to the English-language edition, which is nicely edited by Boris N. Breizman and James W. van Dam. The very satisfying translation from the Russian was done by Natasha Breizman.

The reminiscences in the book vividly portray Budker's originality as a physicist, organizer of scientific enterprises, teacher and person. In all these facets, his life was a nonstop process of generating radically new ideas. Budker took a childlike enjoyment from this process. When his colleagues would start to criticize his latest idea immediately upon hearing of it, he would say: "Wait! Let me get some fun out of it first. Then we will work it out further."

In physics, his genius showed up primarily in high-energy physics and the physics of controlled thermonuclear fusion. The contributions for which he is best known are the stabilized electron beam, the magnetic-mirror plasma trap, colliding beams of electrons and positrons, and electron cooling for proton beams.

A good illustration of Budker's originality as a teacher is the radical innovation in his general physics course at Novosibirsk University, which he opened with a presentation of special relativity. As a freshman, in 1959, I was exposed to this successful, revolutionary experiment in teaching.

Budker was proud of the nickname "engineer of relativity" given to him by Lev Landau. Indeed, he used his