

Books Received/Livres reçus

The following books have been received for review. Readers are invited to write reviews, in English or French, of books of interest to them. Books may be requested from the book review editor G.R. Hébert -- BITNET: "PHYSCAN@SOL.YORKU.CA" or at Department of Physics and Astronomy, York University, 4700 Keele St., North York, Ontario, M3J 1P3. Tel: (416) 736-2100, ext. 77753.

Les livres suivants nous sont parvenus pour la critique qui peut être faite en anglais ou en français. Si vous êtes intéressé de nous communiquer une revue critique sur un ouvrage en particulier, vous êtes invités de vous mettre en rapport avec le responsable de la critique des livres; G.R. Hébert via INTERNET: "PHYSCAN@SOL.YORKU.CA" ou au: Département de physique et d'astronomie, l'Université York, 4700 Keele St., North York, Ont., M3J 1P3; Téléphone: (416) 736-2100, ext. 77753.

00: GENERAL

CHANDRA, A BIOGRAPHY OF S. CHANDRESEKHAR, by Kameshwar, C. Wali, The University of Chicago Press, 1991, pp x + 341. ISBN 0-226-87055-3; QB36.C46W35. Price: \$19.50 pbk.

CHAOS AND FRACTALS, New Frontiers of Science, by Heinz-Otto Peitgen, Hartmut Jürgens, Dietmar Saupe, Springer-Verlag, 1992, pp vi + 984. ISBN 0-387-97903-4; QA614.86.P43. Price: \$49.00 hc.

LONG-RANGE CASIMIR FORCES, THEORY AND RECENT EXPERIMENTS ON ATOMIC SYSTEMS, edited by Frank S. Levin, David A. Micha, Plenum Press, 1993, pp xv + 357. ISBN 0-306-44385-6; QC680.L63. Price: \$75.00 hc.

ORIGIN AND EVOLUTION OF THE ELEMENTS, edited by N. Prantzos, E. Vangioni-Flam, M. Cassé, Cambridge University Press, 1993, pp xvi + 545. ISBN 0-521-43428-9. Price: \$69.95 hc.

THE QUANTUM THEORY OF MOTION, AN ACCOUNT OF THE de BROGLIE-BOHM INTERPRETATION OF QUANTUM MECHANICS, by Peter R. Holland, Cambridge University Press, 1993, pp xix + 598. ISBN 0-521-35404-8. Price: \$120.00 hc.

THE GOLEM, WHAT EVERYONE SHOULD KNOW ABOUT SCIENCE, by Harry Collins, Trevor Pinch, Cambridge University Press, 1993, pp xii + 164. ISBN 0-521-35601-6; Q125.C5.52. Price: \$19.95 hc.

THE QUANTUM DICE, by L.I. Ponomarev, transl. from the Russian by A.P. Repiev, I.O.P. Publ. Ltd., 1993, pp 255. ISBN 0-7503-0251-8 (hc); 0-7503-0241-0 (pbk). Price: \$110.00 hc; \$35.00 pbk.

10: THE PHYSICS OF ELEMENTARY PARTICLES AND FIELDS

THE PRINCIPLES OF CIRCULAR ACCELERATORS AND STORAGE RINGS, by Philip J. Bryant, Kjell Johnsen, Cambridge University Press, 1993, pp xxv + 357. ISBN 0-521-35578-8; QC787.P3B79. Price: \$100.00 hc.

20: NUCLEAR PHYSICS

ALGEBRAIC APPROACHES TO NUCLEAR STRUCTURE, INTERACTING BOSON AND FERMION MODELS, Contemporary Concepts in Physics, v. 6, edited by Richard F. Casten, Harwood Academic Publishers, 1993, pp xv + 554. ISBN 3-7186-0538-4; QC793.3.S8A38. Price: \$38.00 pbk.

SIMPLE MODELS OF COMPLEX NUCLEI, The Shell Model and Interacting Boson Model, Contemporary Concepts in Physics, vol. 7, by Igal Talmi, Harwood Academic Publ., 1993, pp xx + 1074. ISBN 3-7186-0550-3; QC173.T26. Price: \$52.00 pbk.

30: ATOMIC AND MOLECULAR PHYSICS

POLARIZATION BREMSSTRAHLUNG, Physics of Atoms and Molecules Series, ed. by V.N. Tsytovich, I.M. Ojringel, Plenum Press, 1992, pp xxvi + 370. ISBN 0-306-44-217-5; QC484.3.P65. Price: \$89.50 hc.

40: FUNDAMENTAL AREAS OF PHENOMENOLOGY

DEVELOPMENT OF NEW NONLINEAR OPTICAL CRYSTALS IN THE BORATE SERIES, (Laser Science and Technology, An International Handbook, vol. 15), by C.T. Chen, Harwood Academic Publ., 1993, pp vii + 74. ISBN 3-7186-5351-6; QD491.C4.813. Price: \$40.00 pbk.

THEORIES ON DISTRIBUTED FEEDBACK LASERS, (Laser Science and Technology, An International Handbook, vol. 14), by F.K. Kneubühl, Harwood Academic Publ., 1993, pp ix + 94. ISBN 3-7186-5350-8; TA1677.K59. Price: \$45.00 pbk.

THERMODYNAMIQUE APPLIQUÉE, avec 80 exercices et 25 problèmes résolus, par H. Guénoche, C. Sèdes, (Collection Enseignement de la Physique), Masson éditeur, 1993, pp xvii + 333. ISBN 2-225-84230-2. Prix: 260 F, broché.

70: CONDENSED MATTER: ELECTRONIC STRUCTURE, ELECTRICAL, MAGNETIC, AND OPTICAL PROPERTIES

COMPOUND AND JOSEPHSON HIGH-SPEED DEVICES, edited by Takahiko Misugi, Akihiro Shibatomi, Plenum Press, 1993, pp xii + 306. ISBN 0-306-44384-8; TK7874.7.C66. Price: \$69.50 hc.

PHASE TRANSITIONS IN FERROELASTIC AND CO-ELASTIC CRYSTALS, Cambridge Topics in Mineral Physics and Chemistry, Student Ed., by E.K.H. Salje, Cambridge University Press, 1990, pp xiv + 229 + (L App. + 2 pp index). ISBN 0-521-42936-6. Price: \$34.95 pbk.

NEGATIVE DIFFERENTIAL RESISTANCE AND INSTABILITIES IN 2-D SEMICONDUCTORS, NATO ASI Series B: v. 307, edited by N. Balkan, B.K. Ridley, A.J. Vickers, Plenum Press, 1993, pp ix + 443. ISBN 0-306-44490-9; QC611.6.H67N44. Price: \$115.00 hc.

SPIN GLASSES, Cambridge Studies in Magnetism, by K.H. Fischer, J.A. Hertz, Cambridge University Press, 1991, pp x + 408. ISBN 0-521-44777-1; QC176.8.S68F57. Price: \$34.95 pbk.

80: CROSS-DISCIPLINARY PHYSICS AND RELATED AREAS OF SCIENCE AND TECHNOLOGY

ELECTRON BEAM TESTING TECHNOLOGY, Microdevices, Physics and Fabrication Technologies, Edited by John L. Thong, Plenum Press, 1993, pp xvi + 462. ISBN 0-306-44360-0. Price: \$89.50 hc.

FIELD GUIDE TO THE BIRDS OF NORTH AMERICA, 2nd Ed., National Geographic Society, pp 464, 1993. ISBN 0-87044-692-4; QL68.1F53 (1987). Price: \$27.50 Can. pbk.

CELLULAR COMMUNICATION IN PLANTS, Proceedings of the Twenty-first Steenbock Symposium: Cellular Communication in Plants, held in May-June, 1992, in Madison Wis., edited by Richard M. Amasino, Plenum Press, 1993, pp x + 181. ISBN 0-306-44415-1; QK725.C392. Price: \$149.50 hc.

ORGANIC PHOTORECEPTORS FOR IMAGING SYSTEMS, by Paul M. Borsenberger, David S. Weiss, Marcel Dekker, Inc., 1993, pp xvi + 447. ISBN 0-8247-8926-1; TR1045.B67. Price: \$135.00 hc.

QUANTUM CHEMISTRY, by John P. Lowe, Academic Press, 1993, pp xx + 711. ISBN 0-12-457555-2; QD462.L69. Price: \$59.95 hc.

THE MEASUREMENT OF GRAIN BOUNDARY GEOMETRY, (Electron Microscopy in Materials Science Series), by V. Randle, I.O.P. Publ., 1993, pp xi + 169. ISBN 0-7503-0235-6. Price: \$120.00 hc.

Book Reviews / Revues des livres-----

COHERENT RADIATION GENERATION AND PARTICLE ACCELERATION, edited by Prokhorov, AIP, New York, 1992, pp 528. ISBN 0-88318-926-7; LC92-82562. Price: \$120.00 hc.

Edited by Nobel Laureate A.M. Prokhorov of the Russian Academy of Sciences, this book is based on an invited Symposium organized by the La Jolla International School of Physics, Inst. for Advanced Physics, La Jolla, California, in February 1991. It covers theoretical, experimental, and

technological problems addressed by prominent researchers from around the world. Contributors in the series - all of whom were invited - were encouraged by the organizers to go beyond the narrow confines of their work and reflect on broader issues. This is reflected in the incisive essays which review critical issues, critique the field's status, and point the way toward new avenues and trends in research. V. Stefan of the Institute for Advanced Physics Studies, who is the series editor, has put together an excellent volume which documents the latest thinking and future trends in physics research.

The topics covered in these essays are free electron lasers, microwave generators, relativistic beam physics, radiation and energy physics, as well as accelerators and synchrotron radiation physics.

The first part of this book covers topics in coherent radiation generation with a review by Bratman and colleagues on the methods to obtain single mode operation in high power microwave generators. The cyclotron autoresonance MA5ER amplifier is discussed by Danly and colleagues, with possible applications as an RF source in the next generation of linear colliders. There are a number of important discussions on free electron lasers relating operating parameters to scaling laws and the subject of chaos in free electron lasers. Non-linear interaction of ultrashort relativistically strong laser pulses with plasmas is analyzed by Bulanov and colleagues and the optical guiding of such pulses is discussed by Litvak and colleagues.

The second part of the book covers topics on particle acceleration with lasers and plasmas. Three topics are well covered here. Work on the laser plasma beatwave acceleration is discussed in detail and recent progress in this area reported from laboratories in Europe (Dyson), Japan (Kitagawa), and Canada (Ebrahim). Work on particle acceleration in plasma wakefields is discussed, including the excitation of nonlinear wakefields in a plasma by Breizman and colleagues, and the problem of electromagnetic pulse self-focusing in wakefield generation by Garuchava and colleagues, as well as Tsintsadze. Recent experimental work on plasma wakefield acceleration and plasma lens is discussed by Ogata.

From the material presented in this volume, it is clear that the goal set by the symposium organizers was met. The symposium brought together some of the most prominent researchers from around the world. Their discussions indicate the status of some of the areas covered and the future trend in these fields. The interdisciplinary nature of the material will make this book valuable to both veteran researchers and those new to the field.

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COLD FUSION, The Making of a Scientific Controversy, by F. David Peat, Contemporary Books, 1990, pp ii + 204. ISBN 0-8092-4085-8; QC791.735.P43. Price: \$12.00 pbk.

Cold fusion is not the hot topic it once was, and this book, written in 1989 and "updated" in 1991, is more than a little out of date. "Cold Fusion -- The Making of a Scientific Controversy" has a bit of the look of something thrown together quickly to reach bookstores before its subject disappeared from newspaper headlines. In fact, though, it

is a fairly carefully researched and well presented account, in layman's language, of the first year or so of cold fusion mania that followed Pons and Fleischmann's announcement that they had observed nuclear fusion in an electro-chemical cell. Peat explains the physics of fusion in very simple terms, and in a style that should be accessible to the average reader of supermarket tabloids. Facts are repeated -- sometimes three times on a single page -- presumably to ensure that they are absorbed by the reader. Peat paints a detailed picture of the activities of, and interactions among, the scientists involved in the cold fusion controversy, giving the reader an interesting look at how science was done in this rather atypical case. He also discusses how a cheap and easy energy source -- like cold fusion -- would affect society, and presents a few very simplistic scenarios for a cold-fusion-based world.

I would have preferred a somewhat more critical discussion of the various results, while Peat is totally uncritical. He states unambiguously that so-and-so "observed fusion", when in fact what they observed was something else -- heat, or neutrons or, more likely, statistical fluctuations -- which they interpreted as being the result of fusion. He then states that another so-and-so saw nothing. All of this must leave the reader a bit confused about the validity of scientific work --- but then, this is cold fusion we are talking about!

On the whole, I found this book amusing reading. It is obviously not aimed at scientists but rather at the lay public and, given this, I think it is successful.

John de Bruyn
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DIMENSIONAL MAN, by John Cape, Random House of Canada Ltd., 1992(?). ISBN 0-224-02714-X. Price: \$29.95 Can pbk.

DIMENSIONAL MAN by Daniel Pelham is not a book in the purely technical sense. However, it does portray, in life size, a 3-dimensional study of the human body. The "chart" comes wrapped in transparent plastic and has the dimensions of about 78 cm in length, by 31 cm in width. Directions for unfolding and setting up the chart are quite explicit and clear. Once hung, **Dimensional Man** is life size, and opens up out of the plane to about 15 cm in the head and torso areas. It provides an excellent and fascinating introduction to basic anatomy. The chart reveals the locomotor, the cardiovascular, the respiratory, the digestive, and urogenital systems of the human body. A separate numerical index lists the names of individual bones, muscles, organs, arteries, and veins. The corresponding 304 numbers are printed on (and within) the figure itself. I would have preferred to have had some way of attaching this index-list to the chart itself; it is included as a separate chart.

Dimensional Man would have proved quite useful to me when I studied Anatomy and Physiology many years ago. It should prove to be quite helpful to the beginner of such studies today. Further, many of our readers who would enjoy reviewing basic knowledge of the human body might find that **Dimensional Man** just fits the bill at a reasonable price.

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QUANTUM MECHANICS, by Leslie E. Ballentine, Prentice-Hall, 1990, pp 486. ISBN 0-13-747932-8. Price: \$56.00 hc.

Leslie E. Ballentine (Simon Fraser University) offers his readers a senior undergraduate or beginning graduate level text in quantum mechanics that he claims takes "into account the developments in the foundations of the subject that have taken place in the last few decades". His intention is to incorporate "firmly established results" in the theory of measurement which "have not been taken into account in previous textbooks". (Remarks from Preface, p xiii). My main intention here is to comment on whether this book really does succeed as a sound introduction to foundational issues.

Leslie Ballentine has for some years vigorously and eloquently advocated his version of the ensemble interpretation of quantum mechanics, according to which the state vector or density operator represents not an individual quantum system (such as a single pair of correlated electrons) but an ensemble of similarly prepared systems. On this view, measurement involves merely the selection of a subensemble from the total ensemble; there is no "collapse" of the wavefunction. While Ballentine's views are certainly cogent, it would be very difficult to say that they are regarded by those who concern themselves with foundational issues in quantum mechanics as "firmly established". And yet, Ballentine uses an intermediate text to showcase his personal reading of some of the most problematic aspects of quantum theory, making almost no mention of the fact that such matters as the viability of the collapse postulated, the measurement problem, or the interpretation of the quantum state are still subjects of active research and debate. (A glance through recent issues of *Phys.Rev.A* would confirm this). One would think that a text that claims to be foundationally adequate would clearly distinguish between those matters that really are more or less firmly settled, and those that remain open.

Ballentine's inclination to indulge at every opportunity in polemic against the collapse postulate leads him to the border of outright error in his discussion of the "watched-pot paradox" or "quantum Zeno effect", as it is sometimes known. If a quantum system, which undergoes a transition or decay from one state to another, is observed while in the process of transit, there is a probability that the observation will "collapse" the state of the system back to its original state (if I may be pardoned the conventional way of speaking). If the system is repeatedly observed at sufficiently short intervals, its decay may be indefinitely postponed. (This brings to mind the old adage that "a watched pot never boils"). Ballentine (section 12-2) heaps scorn on this prediction, treating it as a 'reductio ad absurdum' of the collapse postulate, and describing it as "... of course, false". Unfortunately for Ballentine, the quantum Zeno effect has been unambiguously observed -- although, in fairness to him, in work reported since his book was published. (See R. Pool, *Science*, v. 246, p. 888, 1991, for a succinct review).

This much having been said, let us note the real merits of this book as a text and reference, especially for those who might be interested in foundations. Ballentine has taken care to cover a number of topics not always found together in introductory and intermediate texts: rigged Hilbert spaces, properties of composite systems (the classification of correlated and uncorrelated states, pp. 162-165, is especially useful), the Bohm theory, Herbert's Inequality, a

very thorough introduction to probability theory, the Aharonov-Bohm effect, symmetry properties, and much more. The problems are excellent and well keyed to the accompanying text.

In spite of my annoyance at this book's general tendentiousness, I have found myself repeatedly going back to it for clarification of such matters as the structure of partial state operators, or the derivation of Bell inequalities. It really is a useful book; but it should be presented to student by a teacher experienced in foundational questions, who can pilot its readers past the occasional rocky shoals, and remind them that some long-standing conundrums of quantum mechanics are not quite as easily dismissed as its author believes.

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ELEMENTS OF PHYSICS, by Marcel Wellner, Plenum Press, 1991, pp xiii + 693. ISBN 0-306-43354-0; QC21.2.W437. Price: \$49.50 hc.

Comme l'indique l'auteur dans sa préface, ce manuel est la réponse à un besoin ressenti par des étudiants en sciences ou en génie qui ont à suivre des cours techniques de base requérant des connaissances dans l'ensemble de la physique. Les 28 chapitres, passablement développés et orientés sur la continuité des sujets traités, ont été planifiés pour être couverts en deux ou trois sessions. Le livre couvre les mêmes sujets que dans un cours collégial normal (mécanique, électromagnétisme, optique physique, et géométrique, physique moderne) et avec, en plus, l'étude des fluides et de la chaleur. Le niveau mathématique dépasse celui d'un cours comme le Physical Science Study Committee (PSSC) par exemple, car il introduit les notions de base de calcul différentiel et intégrale. Mais la puissance de ce calcul est laissée de côté la plupart du temps, au profit des concepts physiques introduits et de leurs compréhension. Sous cet aspect donc, les manuels utilisés dans un cours collégial sont de niveau supérieur mais ils sont destinés à une clientèle différente.

Le manuel couvre bien l'ensemble des concepts normalement vus dans un tel cours: ils sont expliqués succinctement (nous laissant parfois sur notre faim) mais clairement. L'auteur les illustre abondamment de dessins, schémas, et graphiques explicites. Il ramène parfois des approches anciennes (lignes de champ, pôles magnétiques). Pour favoriser la continuité de l'approche, les digressions sont renvoyées en fin de chapitre, où l'on rencontre également un résumé des principales équations de chapitre. On y trouve également un grand nombre de questions «Vraie ou faux?» et de problèmes, pratiques et très bien illustrés, dans lesquels l'auteur a cherché à éviter à l'étudiant un travail technique trop élaboré ou fastidieux. Les réponses à toutes les questions, les réponses et/ou des indices à plusieurs problèmes sont fournis en fin de chaque chapitre.

Tout au long du volume, en plus des tables généralement présentées dans un manuel de ce genre, l'auteur a parsemé des échelles logarithmiques donnant les ordres de grandeur d'un grand nombre de variables physiques (forces, pressions, moment angulaire, intensité de champs, transparence de l'atmosphère, etc.), de façon à en donner des exemples rencontrés dans notre environnement plus ou

moins immédiat: l'auteur a aussi pris soin d'en faire une liste en annexe pour que la lecteur puisse les retrouver plus facilement.

Mentionnons en dernier lieu que dans les annexes, nous retrouvons une table de conversion en unités SI, d'anciennes unités encore parfois utilisées ici et là pour diverses raisons (carat, BTU, gallon, etc.); une liste de tables et de spectres utilisés dans l'ouvrage et un index bien développé. En résumé, l'auteur a bien atteint le but qu'il s'était fixé et son livre peut aussi servir d'ouvrage de référence pour d'autres clientèles de niveau collégial.

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QUERY: A new subsection of Book Reviews.

We will publish questions about help and advice on finding suitable texts for certain academic courses or for certain subject matters as requested by you, our readers. Answers, again from our readers, will be published in a subsequent issue of PiC. We will maintain anonymity if so requested.

Q3: Can one of you readers suggest a good, suitable, textbook for a 2nd course on Fluid Dynamics?

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RESUMES ON FILE

This is a new initiative undertaken by the CAP to assist its members who are currently searching for employment opportunities. Interested employers should contact the CAP in writing and quote the appropriate resumé number.

Resume No. 1 - Fully bilingual (French/English) Canadian citizen with Ph.D. in solid state physics (1983). Upgraded skills through computer science courses in 1987, 88, and 93. Primary skills include software design, development and testing. Experienced in spectroscopy (optical, infrared, Raman), lasers, recorders, plotters, cryogenics, photon counting systems. Experienced in software analysis, the design review process, writing software documentation and user manuals. Familiar with NASA standards, practices, and procedures.

Resume No. 2 - M.Sc. (1976); 5 ans comme conseiller scientifique à la commission de contrôle de l'énergie atomique; 5 ans d'enseignement de la physique; 5 ans de recherche en sylvichimie et en biomécanique. Découvertes: Détermination des niveaux excités du Co^{55,57}, découverte de la meilleure vis à os spongieux, découverte d'un procédé de blanchiment de la pâte ne polluant pas.