Having developed an introductory course on nanoscience for beginning graduate students in materials science, I was very interested whether such a broad topic could be reasonably represented in a single volume written by just two authors.

The approach adopted in this book assumes the reader is only slightly acquainted with the technical subject matter and thus provides a background for each topic. The text begins with two introductory chapters on the physics of the solid state and methods for characterizing the structure and properties of materials. Each subsequent chapter is more or less self-contained and includes introductory material, methods of synthesis, structure, properties, and in some cases, applications. Although the authors note that they cannot possibly cover every important topic in nanotechnology, they do cover most of the more important topics that would be expected—quantum dots, nanotubes, magnetoresistance, catalysis, DNA, and MEMS.

The two authors working together have maintained a consistent perspective and level throughout the book. As can be expected, however, subjects most familiar to the authors, such as ferrofluidics, are well covered while those less familiar, such as mechanical properties, lack some of the key ideas. The primary benefit from the authors' approach is that the reader can quickly locate specific subjects and, with very little previous knowledge, obtain a brief description of them. Most topics are covered in a few paragraphs. Read in its entirety, the book provides a good appreciation of the diversity and possibilities of the field.

Although the encyclopedic style of *Introduction to Nanotechnology* offers quick access to information, it is not conducive to developing the underlying principles of the field. Subjects such as the thermodynamics, kinetics, lithography, and magnetic behavior of small particles are covered ad hoc as they appear in specific discussions. For example, in describing the synthesis of nanoparticles, the authors provide a few chemical equations for the overall reaction in specific examples, but they do not describe the kinetics that controls the size of the particles. Similarly, the book mentions that, compared with their bulk forms, small particles can have lowered melting temperatures, different structures, and other modified properties, but the underlying thermodynamics principles that link these behaviors are not developed. The book, therefore, would not serve well as a textbook, but that was not the authors' main goal.

Finally, one wonders how quickly the book will become dated. Poole and Owens have attempted to choose subjects partly on the basis of maturity of the field, but clearly, some of the subjects have already moved far beyond the author's treatment of them. The good news is that *Introduction to Nanotechnology* is short and can be easily revised from time to time.

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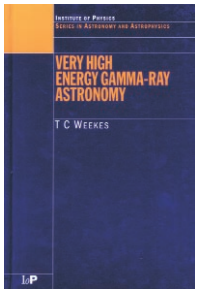
Very High Energy Gamma-Ray Astronomy

T. C. Weekes
IOP, Philadelphia, 2003. $135.00 (221 pp.). ISBN 0-7503-0658-0

Astronomy experienced unprecedented growth in the latter half of the 20th century and has transformed into a vibrant, dynamic discipline within the physical sciences. The evolutionary path expanded the field from optical astronomy (the historical parent of modern astronomy); to radio and IR-band astronomy; and then, with technological developments in space, to ultraviolet, x-ray, and gamma-ray astronomy. The latest pivotal development in this sequence concerns the field of high-energy gamma-ray astrophysics, which is the subject of Trevor C. Weekes's *Very High Energy Gamma-Ray Astronomy*.



This subfield of astronomy is emerging from its fledgling status to become an integral contributor to our understanding of the most energetic phenomena in the post-recombination universe. The principal experimental techniques divide the gamma-ray energy range naturally: Photons below 50 GeV are best detected by space missions, while those of much higher energy, generally up to 10 TeV, are observed with ground-based telescopes that measure Čerenkov radiation. Such radiation comes from atmospheric showers initiated by incident energetic cosmic rays and photons.

Weekes is the foremost pioneer in the atmospheric Čerenkov experimental discipline. His efforts with the

Whipple Telescope led to the discovery, in the late 1980s, of TeV gamma rays from the Crab Nebula and other celestial sources, most notably active galactic nuclei (AGN). For his seminal contribution, Weekes was awarded the 1997 Bruno Rossi Prize, the American Astronomical Society's highest honor in high-energy astrophysics. It is fitting that, through his book, Weekes provides the most comprehensive exposition to date on high-energy gamma-ray astronomy.

Very High Energy Gamma-Ray Astronomy is written at the graduate or, perhaps, senior-undergraduate level. It is also a useful text for experimentalists, observers, and theorists. The book contains no worked problems, and readers desiring such will need to seek other sources to complement this text. Because it is not heavily imbued with mathematical developments, the text is extremely digestible and accessible to an audience much broader than just high-energy astronomy specialists. It is a pleasure to read. Occasional historical anecdotes animate the book and provide readers with insight and perspective that reflect the author's inimitable style. Weekes is almost uniquely placed to provide such historical viewpoints. The emerging scientist can benefit much from Weekes's knowledge of a young field now reaping the fruits of his and others' labors.

The text begins with a brief exposition of key developments in the "heroic era of gamma-ray astronomy," as Weekes defines it, and discusses salient characteristics of the atmospheric Čerenkov technique and then space-based telescopes. These first three chapters, useful surveys of those subjects, summarize the most critical elements but do not penetrate deep into any given territory. That approach is the essential style of Weekes's work: Provide an overview to serve as a valuable introduction, offer readers appropriate references, and then leave those readers who desire greater depth in specific topics to use the text as a springboard into further enlightenment. The first three chapters include a look ahead to next-generation instrumental developments that either are now or will soon be on line; the book thus provides the reader with an appropriate connection to potentially exciting future discoveries.

The majority of the book is a discussion of the status quo of observations and theoretical models pertaining to various astronomical high-energy gamma-ray sources, ranging from diffuse emission, supernova remnants and nebulae, and pulsars, to the exotic extragalactic objects of AGN and gamma-ray bursts. These discussions are again surveys, with the expositions on AGN and supernova remnants and nebulae, subjects closest to Weekes's research interests, receiving the greatest depth of coverage. Weekes devotes an entire chapter to the Crab Nebula, which is absolutely appropriate given that its discovery was the watershed development in the subfield of TeV astronomy. Moreover, the Crab Nebula continues to serve as the benchmark for instrumental calibration in atmospheric Čerenkov telescopes.

Readers will find that Weekes's discussions of the astronomical sources are good background material that will whet their appetites. But those who desire alternative perspectives will need to peruse appropriate conference review papers and the general literature. The appendix on radiation processes is fairly limited in its content. It provides a modicum of background for the textual expositions; gamma-ray astrophysics specialists will desire other, more comprehensive sources of information.

A small portion of the material presented in Weekes's book is out of date, a reflection of the rapid development of observations and models in high-energy gamma-ray astrophysics. But the out-of-date portion does not in any way devalue the book, which will serve as a timely contribution to the academic literature for years to come. Weekes's work is complementary in style, content, and perspective to extant gamma-ray astronomy texts, such as those by Carl Fichtel, Jacob Trombka, Floyd Stecker, and Volker Schönfelder. Coming from the father of TeV gamma-ray astronomy, *Very High Energy Gamma-Ray Astronomy* will prove a worthy addition to such company.

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New Books

Acoustics

Concert Halls and Opera Houses: Music, Acoustics, and Architecture. 2nd ed. L. Beranek. Springer-Verlag, New York, 2004 [1996]. $69.00 (661 pp.). ISBN 0-387-95524-0

Astronomy and Astrophysics

Accretion Discs, Jets and High Energy Phenomena in Astrophysics. V. Beskin, G. Henri, F. Menard, G. Pelletier, J. Dalibard, eds. *NATO Advanced Study Institute*. Proc. sch., Grenoble, France, July–Aug. 2002. EDP Sciences, Paris, and Springer-Verlag, New York, 2003. $159.00 (625 pp.). ISBN 2-86883-702-6 (EDP Sciences), ISBN 3-540-20171-8 (Springer-Verlag)

Advanced Astrophysics. N. Duric. Cambridge U. Press, New York, 2004. $110.00, $60.00 *paper* (296 pp.). ISBN 0-521-81967-9, ISBN 0-521-52571-3 *paper*

Astronomy Methods: A Physical Approach to Astronomical Observations. H. Bradt. Cambridge U. Press, New York, 2004. $110.00, $60.00 *paper* (433 pp.). ISBN 0-521-36440-X, ISBN 0-521-53551-4 *paper*

Astrophysics Update. J. W. Mason, ed. *Springer-Praxis Books in Astrophysics and Astronomy*. Praxis/Springer-Verlag, New York, 2004. $119.00 (314 pp.). ISBN 3-540-40642-5

High Energy Processes and Phenomena in Astrophysics. X. D. Li, V. Trimble, Z. R. Wang, eds. *International Astronomical Union Symposium 214*. Proc. symp., Suzhou, China, Aug. 2002. International Astronomical Union, Paris, and Astronomical Society of the Pacific, San Francisco, 2003. $95.00 (427 pp.). ISBN 1-58381-157-5

Sky Vistas: Astronomy for Binoculars and Richest-Field Telescopes. C. Crossen, G. Rhemann. Springer-Verlag, New York, 2004. $69.95 (279 pp.). ISBN 3-211-00851-9

Symbiotic Stars Probing Stellar Evolution. R. L. M. Corradi, J. Mikołajewska, T. J. Mahoney, eds. *Astronomical Society of the Pacific Conference Series 303*. Proc. conf., La Palma, Spain, May 2002. Astronomical Society of the Pacific, San Francisco, 2003. $57.00 (564 pp.). ISBN 1-58381-152-4

Atomic and Molecular Physics

Atom Tunneling Phenomena in Physics, Chemistry and Biology. T. Miyazaki, ed. *Springer Series on Atomic, Optical, and Plasma Physics 36*. Springer-Verlag, New York, 2004. $119.00 (313 pp.). ISBN 3-540-01526-4

Atomic Physics: An Exploration Through Problems and Solutions. D. Budker, D. F. Kimball, D. P. DeMille. Oxford U. Press, New York, 2004. $99.50, $49.50 *paper* (441 pp.). ISBN 0-19-850949-9, ISBN 0-19-850950-2 *paper*

Dynamical Theory of X-ray Diffraction. A. Authier. *IUCr Monographs on Crystallography 11*. Oxford U. Press, New York, 2004 [2002, reissued]. $89.50 *paper* (674 pp.). ISBN 0-19-852892-2

Principles of Quantum Scattering Theory. D. Belkić. *Series in Atomic and Molecular Physics*. IOP, Philadelphia, 2004. $120.00 (371 pp.). ISBN 0-7503-0496-0

Quantum Squeezing. P. D. Drummond, Z. Ficek, eds. *Springer Series on Atomic, Optical, and Plasma Physics 27*. Springer-Verlag, New York, 2004. $89.95 (370 pp.). ISBN 3-540-65989-7

Biological and Medical Physics

Biomicroelectromechanical Systems