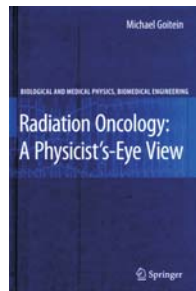


seen from the radiation source. His stated intention for the book is to describe as simply as possible from a physicist's perspective the use of radiation in the treatment of cancer. In the attempt, he succeeds admirably, but his account does not cover clinical issues; also, it exclusively embraces high-energy x-ray and proton-beam therapies, a focus that reflects the author's main interests in radiation oncology and major contributions to the field. For three decades Goitein was involved in unique developments in those two treatment modalities at Massachusetts General Hospital in Boston, and he is now a professor emeritus of radiation oncology at Harvard University Medical School.



Treatment planning in radiation oncology essentially involves designing a set of radiation beams to maximize the therapeutic ratio, the ratio between tumor-control probability (TCP) and normal-tissue complication probability (NTCP). Until the 1970s it was only possible to do such calculations by hand, although some computer programs were available to enhance the process. The treatment plan essentially involved a set of isodose contours superimposed on a hand drawing of a transverse cross section of a patient's anatomy. The invention of whole-body computed x-ray tomography (CT), for which physicists Allan Cormack and Godfrey Hounsfield shared the 1979 Nobel Prize in Physiology or Medicine, and rapid advances in computer technology changed all of that.

Goitein realized the potential of the new technology and led the development of three-dimensional treatment planning using CT images. Today 97% of radiation-therapy treatments in the US involve CT imaging. Goitein is also well known for his development and practical use of a variety of other tools, such as digitally reconstructed radiographs (DRRs), which are radiographs from any direction computed from a set of CT images of the patient (a beam's-eye view is an example of a DRR); biophysical models for assessing TCPs and NTCPs; and dose-volume histograms for assessing treatment plans and deriving relevant dose statistics for a specific plan.

Until the 1990s a goal of radiation therapy was to provide a uniform dose distribution in the target volume. Treatment plans to accomplish that objective were constructed from individual beams, each with uniform intensity, with some exceptions usually involving wedges or compensating filters. In the

late 1980s, Cormack and others developed the concept of intensity-modulated radiation therapy (IMRT), in which individual beams of nonuniform intensity could be used to provide either uniform or nonuniform dose distributions in the target volume. The advantage of that technique compared with uniform-intensity radiation therapy is better conformation of the dose to complex target volumes, specifically concave ones, and improved sparing of surrounding normal tissues. The technique is now routine in x-ray therapy and will find increasing application in proton therapy.

Radiation Oncology gives detailed discussions of the topics mentioned above. Also covered are interactions of radiation with matter; uncertainty in radiation oncology quantities, a topic that in Goitein's view is often not adequately addressed; delineation of anatomy; radiobiological issues; motion management; optimization in IMRT treatment planning; and confidence and quality assurance.

The rationale for using protons for radiation therapy lies in their physical properties, which result in near-zero dose beyond the target volume and thus provide the ability to conform the planned dose more closely to the specified target volume than is feasible by photon techniques. The author was also responsible for developing and implementing new techniques for proton therapy at the Harvard Cyclotron Laboratory, where nearly 10 000 patients were treated. Furthermore, he was instrumental in establishing the Francis H. Burr Proton Therapy Center at Massachusetts General Hospital. Proton therapy is a rapidly proliferating field and is now firmly established in radiation oncologists' armamentarium. Goitein's treatment of the topic is clear and easy to follow, and he highlights the differences between proton and x-ray therapies. He divides the subject into two separate chapters that make up about 25% of the book: chapter 10, "Proton Therapy in Water," for the ideal situation, and chapter 11, "Proton Therapy in the Patient," for the clinical and far more complex scenario. The book contains full descriptions of all other relevant topics, including the production and delivery of passively scattered and scanned beams, dose distributions, treatment planning, and assessment of the effects of tissue inhomogeneities. That last topic is critically important in proton and other charged-particle therapies, because unlike the case with neu-

tral beams, the beam range is affected rather than the intensity.

Radiation Oncology is neither a textbook nor an autobiography: It provides a lucid account of some of the modern technologies and methods in radiation therapy in which the author has been a leader. Although I am not aware of any other texts quite like it, Goitein's book does have some similarities to *People and Particles* (San Francisco Press, 1997), a largely autobiographical account written by biophysicist Cornelius Tobias and his wife, Ida. Goitein's avoidance of mathematical formulas makes his treatise easily readable. The footnotes that elaborate concepts and definitions are useful, and the author explains concepts clearly and provides extensive illustrations and understandable diagrams. I found some of the figures to be rather small, but they do not really detract from the quality of the work. Goitein's book presents excellent background and is an invaluable resource not only for the experienced practitioner but also for the radiation oncologist, medical physicist, or dosimetrist who is new to the field.

Dan Jones

Cape Town, South Africa

Beyond the Hoax Science, Philosophy and Culture

Alan Sokal

Oxford U. Press, New York, 2008.

\$34.95 (465 pp.).

ISBN 978-0-19-923920-7

Alan Sokal was once my hero. His brilliant parody of postmodern academic prose, "Transgressing the Boundaries: Towards a Transformative Hermeneutics of Quantum Gravity," appeared in 1996 in the cultural studies journal *Social Text*. The journal's editor took the article seriously; I thought it was the funniest thing I had read in years. But a joke is easily ruined if you explain it too much, and Sokal has done just that—first in a long article in *Lingua Franca* announcing his hoax and then repeatedly in other publications.

Now, the superb parodist has become a parody of himself. His new book, *Beyond the Hoax: Science, Philosophy and Culture*, is anything but new. It consists almost entirely of reprints of previously published articles, including two pieces co-authored with theoretical physicist Jean Bricmont. Perhaps more troubling is that the reprinted articles say the same thing over and over again. Sokal, a professor of physics at

New York University, has in the past decade made a second career out of peddling just one idea.

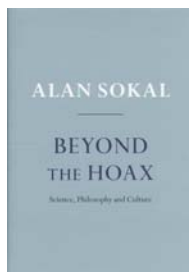
It is perhaps unfair to say there is nothing new in his book. Sokal presents not only his original hoax article but also his own running commentary on it, including a whole new set of footnotes. In case you missed a joke in the original, he explains every single one of them at some length. He even tells readers which of his jokes are his favorites. Amply displayed in his volume is an intellectual mean-spiritedness that might surprise readers familiar only with the original hoax article. Sokal's method relies on finding the most ridiculous possible passages—real quotations from scholars—to lampoon. He has not the slightest interest in finding any redeeming qualities in the academic works of those he quotes, because it would undermine his unshakeable belief that we scientists are surrounded by barbarians.

Perhaps most disappointing is Sokal's turning a blind eye to the work of others who look with more subtlety at some of the issues he raises. He does not mention Mara Beller's excellent article, "The Sokal Hoax: At Whom Are We Laughing?" in *PHYSICS TODAY* (Sep-

tember 1998, page 29). Beller showed that much of the undeniable humor in "Transgressing the Boundaries" came from the quotes by Niels Bohr and Werner Heisenberg, which were crucial to setting up the equally silly remarks by Jacques Lacan and Jacques Derrida. And if so, then, as her

title asks, at whom are we laughing? What does it mean when famous physicists are responsible for convincing the world that physics can be used as a source of far-fetched analogies for speculation about the widest possible range of nonscientific subjects?

David Mermin's work is also shamefully neglected in Sokal's book. For example, in March (page 11) and April (page 11) of 1996, Mermin wrote two Reference Frame articles in *PHYSICS TODAY* concerning the sociology of science. The April piece in particular raises serious questions about the account of the history of relativity in *The Golem: What Everyone Should Know About Science* (Cambridge University Press, 1993), a popular book by sociologists Harry Collins and Trevor Pinch. The dialog that later ensued in the *Letters* pages of the magazine (July 1996, page



11) was fascinating—a genuine exchange of views that, in the end, led to actual clarification and new insight on both sides.

Sokal might have mentioned his collaboration with Collins in *The One Culture? A Conversation About Science* (University of Chicago Press, 2001); Collins and Jay A.

Labinger edited the book, to which Mermin and I also contributed articles. Yet there is nary a mention in *Beyond the Hoax* of Sokal's three articles from that edition. Evidently, the constructive and respectful tone of the discussion in *The One Culture* did not fit with the tone of high dudgeon that characterizes Sokal's new book. Nor did that earlier collaboration stop Sokal from repeatedly (three times by my count) quoting out of context a half-sentence of Collins's from a 1981 article in the journal *Philosophy of the Social Sciences* and holding it up to ridicule. Then, at each occurrence, with identically worded footnotes, he grudgingly mentions that perhaps Collins's views were somewhat less reprehensible than first appeared. That is hardly collegial behavior.

Toward the end of *Beyond the Hoax*, two new essays attack religion, which

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Two large fragments of the book, *Nuclear Physics in a Nutshell* by Carlos A. Bertulani, published by Princeton University Press 2007, ISBN13: 978-0-691-12505-3, contain material from the article, "Interactions, Symmetry Breaking, and Effective Fields from Quarks to Nuclei," by Jacek Dobaczewski, published in 2005 in the volume *Trends in Field Theory Research*, page 157, by Nova Science Publishers, ISBN 1-59454-123-X. Due to an error made by Dr. Bertulani, Dr. Dobaczewski's article was not cited in the book.

The corresponding text includes the last paragraph of page 81 to the end of subsection 3.4.1 on page 84, including figure 3.3; the first sentence of subsection 3.4.4 on page 87 to the last paragraph of this subsection on page 88; and subsection 3.5 on pages 95-96.

A corrigendum will be inserted into all existing copies of *Nuclear Physics in a Nutshell*. In addition, Dr. Bertulani will include an original presentation of the material in any reprints of the book, with proper citation to Dr. Dobaczewski's work.

Dr. Bertulani sincerely apologizes to Dr. Dobaczewski and assumes all responsibility for this unpleasant event.

C.A. Bertulani

Sokal considers the most dangerous form of pseudoscience because it plays the largest role in society. His us-against-the-barbarians attitude is again prominently on display, but here it leads Sokal to tortured reflection. As a committed leftist, he would love to build a movement to help the working class, but he realizes that most of the people he'd like to help hold precisely the views that he considers both stupid and dangerous. In the concluding essay, Sokal struggles fruitlessly to suggest possible strategies for finding common ground; he reluctantly admits, for example, that mistaken religious beliefs have led people to moral (read "leftist") actions. Thus the book ends, paradoxically, with just the slightest hint of intellectual humility and desire for dialog. Too bad that attitude isn't more evident in the book.

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Atmospheric Acoustic Remote Sensing

Stuart Bradley
CRC Press/Taylor & Francis, Boca Raton, FL, 2008. \$119.95 (271 pp.). ISBN 978-0-8493-3588-4

Modern atmospheric acoustic remote sensing began in 1968 with L. G. McAllister's invention of sodar, sonic detection and ranging, also known as echosonde. The term "echosonde" accurately depicts the physical process underlying the operation of an acoustic sounder, which uses echoes for remote sensing. Over the years, however, sodar has become the most commonly used term to designate those systems. Remote sensing of the atmosphere also uses radio acoustic sounding systems, or RASS.

Low-cost, commercially available

sodar systems quickly appeared on the market in the 1970s, and many groups from around the world explored various applications for the technology. Today, several prominent companies manufacture sodar systems that are typically used to determine wind speed and direction, and information about the turbulent atmosphere. They are also increasingly used for wind measurements to monitor conditions affecting wind-energy generation and to study and understand the atmospheric boundary layer in relation to air pollution and in dispersion modeling.

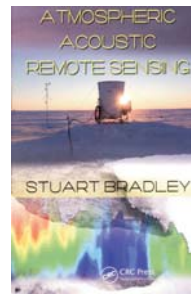
A wealth of research papers published in journals and conference proceedings cover applications of acoustic remote sensing. The first comprehensive survey is in *Acoustic Remote Sensing Applications* (Springer, 1997), a selection of research articles edited by Sagar Singal. Almost 20 years earlier, Edmund Brown and Freeman Hall Jr had published their excellent article, "Advances in Atmospheric Acoustics," in the 1978 issue of *Reviews of Geophysics and Space Physics*. But for nonexpert scientists and engineers who want to understand and implement the technology in their own research, no reliable reference on sodar systems and RASS has been available—until now.

Atmospheric Acoustic Remote Sensing by Stuart Bradley fills the gap. Written by an internationally recognized authority in the design and use of sodar systems and RASS, the book accomplishes what it aims to do: provide "a useful description of how atmospheric acoustic remote sensing systems work and [give] the reader insights into their strengths and limitations." Bradley's book begins with a brief introduction of the subject, followed by background materials on basic meteorology and sound propagation. The background on

meteorology is a useful review for scientists somewhat familiar with the subject; however, someone reading about it for the first time would do well to consult the references Bradley provides for a more complete treatment. For example, Geoffrey Taylor's "frozen turbulence" hypothesis is discussed, and that hypothesis is not introduced in the background chapters.

The book systematically explains the underlying operation of sodar systems, a feature that is the core and strength of the book. The discussion includes how beams of sound are formed, how scattered sound is detected, and how systems are designed to optimize retrieving atmospheric parameters. Bradley considers calibration issues and gives details on actual designs; he thus makes the connection between the hardware and theoretical considerations. In addition, he covers dish antennas, phased-array antennas, and monostatic and bistatic sodar systems. His treatment of signal processing, a major part of sodar design, is relatively thorough. Often the author skips the detailed theoretical analysis and instead presents an intuitive description of the science. Ample numerical examples provided throughout demonstrate the intuitive understanding that Bradley is striving to achieve; the book also includes 15 full-color images and five appendices. No attempt is made to provide exhaustive references, but many key references in the field are cited.

The book seems to lose a bit of momentum toward the end. Bradley gives only a brief overview of RASS, and his discussion regarding specific applications is even shorter. In fact, the book is often somewhat uneven. Sections that present detailed coverage and numerical examples are often followed by sections that are terse. The text also shows



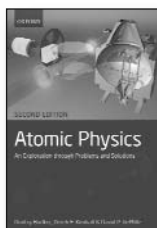
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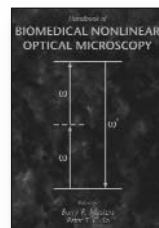
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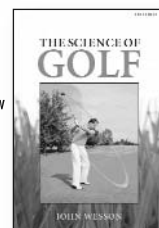
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