the major part of the book, the reader comes to know the essentials of the geometric properties of the percolation transition. Guided by exact solutions in one-dimensional systems and in so-called Cayley trees, Stauffer develops more general scaling theories for the cluster numbers and related quantities. He explains extensively the fractal structure of the clusters near p_c, including a simple derivation of the expression for the fractal dimension, and performs a (somewhat too short) excursion into renormalization groups. Wherever possible, Stauffer shows connections to the more conventional thermal phase transitions.

In the second part of the book the reader is introduced to transport phenomena near the percolation transition, which is a subject of great current interest. Here Stauffer treats dc conductivity, kinetics of clusters and anomalous diffusion. In an appendix, he discusses numerical techniques—in particular the Monte Carlo method. In covering that method, he helps the reader to get his own programming experience by presenting FORTRAN programs. I enjoyed this part very much, but I missed here references to alternative approaches, such as the exact enumeration method for diffusion processes, which for many purposes is superior to the Monte Carlo method. I also would have appreciated a more thorough discussion of physical applications. It is remarkable that the book, published in 1985, covers developments as recent as 1984. However, significant progress has been made since that time. Perhaps Stauffer should consider writing a sequel.

In summary, Stauffer's book represents a nice and humorously written introduction to a fascinating new field. Because of the pedagogical efforts of the author and the intelligent selection of topics (advanced mathematical approaches have been omitted) it is easily accessible to a broad readership with an elementary background in statistical physics. I only regret that students have to pay almost 20 cents per page for this excellent monograph.

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By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age

Paul Boyer
440 pp. Pantheon, New York, 1985.
ISBN 0-394-52878-6 $22.50 hardcover

Above my desk hangs a framed copy of *The New York Times* dated 7 August

1945. "First atomic bomb dropped on Japan, missile is equal to 20,000 tons of TNT; Truman warns foe of a 'rain of ruin,' " the headlines boldly declare. Just below, in more restrained type, the *Times* declared that "one of the scientific landmarks of the century had been passed" and that the bomb had ushered in a new age of atomic energy, "which can be a tremendous force for the advancement of civilization as well as for destruction."

In those first days and months of the atomic age, the dichotomy between peaceful and military uses derived from harnessing the power of the atom became woven into the social fabric of American life. By examining America's cultural response to the bomb in the postwar period, Paul Boyer not only explores the origins of what one historian has termed "The Great Nuclear Debate," he has also provided a critical retrospective analysis for America's current intellectual wrestling match with the Strategic Defense Initiative.

Boyer, a cultural historian at the University of Wisconsin, Madison, describes how government officials, scientists, writers and religious leaders attempted between 1945 and 1950 to come to grips with the enormous power and promise of the atom. His account of the dilemma of the atomic scientists ends on a provocative note. The collective parents of the bomb, many of them veterans of the Manhattan Project, concluded that it was their responsibility to shape policy on atomic energy. "Many of the post-Hiroshima cultural developments," Boyer argues, "cannot be fully understood without attention to the remarkable public role played by the atomic scientists." The initial product of the scientists' movement came in the early summer of 1945 from a group at the University of Chicago. The Franck report, named for physicist James Franck, sought a demonstration shot before direct military use. Although not heeded by government policymakers, the report announced the entrance of the scientists into the political arena.

By 1946 scientists from Oak Ridge, Los Alamos and Chicago had organized the Federation of Atomic Scientists, and the Chicago group had founded what would become the most influential journal on atomic energy in the period, the *Bulletin of the Atomic Scientists*. Edited by Eugene Rabinowitch, the *Bulletin*, with its famous clock on the cover, exerted enormous influence on American officials and educators. Boyer argues that for a time between 1945 and 1957, the pronouncements of the atomic scientists on the awesome destructive power of the bomb were received in an atmosphere of almost religious attention. But the crusade failed, a victim of America's preoccupation with a greater fear—communism—and more pressing daily concerns. Indeed, Boyer believes that the scientists' use of fear "created fertile psychological soil for the ideology of American nuclear superiority and an all-out crusade against communism."

Until now scholars have focused on the political, international, technological and scientific aspects of the nuclear debate. *By the Bomb's Early Light* is the first important history of the intellectual and cultural ferment that has fashioned that debate for nearly half a century. As a result, Boyer's exhaustive study of the multifaceted components of American life that shaped our cultural courtship with atomic energy constitutes an important contribution to understanding our current nuclear dilemma.

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Superstrings: The First 15 Years of Superstring Theory, Volumes 1 and 2

Edited by John H. Schwarz

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ISBN 9971-978-66-0 $86.00 hardcover;
ISBN 9971-978-67-9 $44.00 paper

The recent interest in superstrings as candidates for unified theories has been made possible by the work of many researchers, spanning almost 20 years, and it is worthwhile to acquaint students with these contributions. *Superstrings* is a collection of reprints of most of the seminal papers published from 1971, when superstrings were conceived, to 1985. This collection is edited by John Schwarz, who has organized the presentation into 13 (half of 26) chapters. Each chapter starts with an introduction that sets the historical background and describes in nontechnical terms the work done in the reprinted papers, as well as in other papers that the editor felt to be of peripheral interest. These introductions are well written and informative, providing the reader with many historical vignettes and with a glimpse into the inner workings of some string theorists in their lean years.

The first chapter starts with a review by the late Joel Scherk; it serves as a summary of the previous work from which superstrings emerged. Then the original papers on superstrings are presented, followed by papers on the "no ghosts" theorem and on the first quantized superstring interaction. These serve to illustrate the "old approach" to superstring theories. From the calculational viewpoint the technical achievements of these papers have yet to be surpassed. Chapter 5 contains the original papers linking string theories to gravity. The next two chapters focus on papers that exploit the new symmetry implied by the original superstring papers (supersymmetry), both on the world sheet and in space-time. The emergence of the new "type II" superstring theories is then documented.

The second volume begins with a presentation of some of the original papers on the light-cone string field theory, followed by the detailed papers on the field theory formulation of type II theories. Chapter 12 presents the original papers on anomalies in superstring theories, including the groundbreaking paper of Michael Green and John Schwarz that originated the renaissance of string theories. This set of reprints ends with the first attempts to establish a bridge between our world and the 26-dimensional one of the superstring.

Like many collections of reprints, this one is heavily influenced by the tastes and views of the editor; thus one can argue that many papers that are more conceptual than calculational in nature are not included, and that in certain instances the presentation follows too closely Schwarz's own work. Nevertheless, the advantages of this book far outweigh whatever drawbacks it may have. Schwarz has succeeded in assembling in these two volumes most of the important papers depicting the saga of superstring theories from their emergence, through their dark ages and into their glorious renaissance. This two-volume set also exposes the starting student to the calculational techniques developed in the early papers. The existence of this excellent book of reprints covering the beginning of the superstring era suggests a need for a similar effort to document the era when strings were known as dual resonance models. No serious student of superstring theories should be without this set of reprints, and I am recommending it to my students.

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The Making of American Industrial Research: Science and Business at GE and Bell, 1876–1926

Leonard S. Reich

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ISBN 0-521-30529-2 $24.95 hardcover

From at least the time of Joseph Henry, American scientists and scholars of