

try. The discussion on nuclear waste management is especially relevant—particularly the handling and ultimate disposal of spent nuclear fuel.

In the book's opening chapter, the author identifies the nadir of the nuclear power industry: It was not the accident at Three Mile Island or Chernobyl but rather the decision in the early 1990s to decommission the brand-new Shoreham boiling-water reactor on Long Island, New York. He attributes the decision to the triumph of economists over engineers. Perhaps he is right. But even at the time, the foundations for a future renaissance had been already developed from lessons learned at Three Mile Island and Chernobyl. Today's nuclear power plants are performing at the highest levels in their history. Safe, reliable, cost-effective operations are making the case for the renaissance and are creating favorable trends in public acceptance. Ultimately, Nuttall asserts, the decision will be one of policy, not technology—and that policy will be shaped by the perceived benefits to society, such as reducing the use of fossil fuels and the emissions of greenhouse gases.

Nuttall expresses reservations about nuclear power. In the book's afterword, he admits he would be inclined

to view the world as a better place had nuclear fission never existed. But given that it does exist, he believes that nuclear power deserves to be considered on its merits but with no manifest right to contribute to power generation. Although the book's title might lead one to conclude that the author is an advocate of the use of nuclear power, Nuttall maintains a reserved outlook on whether the renaissance will or should occur. It is refreshing for readers to be able to examine a controversial topic like nuclear power without feeling that the author is pushing an agenda. Most books or articles are either pro or con about the subject. Nuttall's book is nonjudgmental.

I found myself questioning the intended audience for *Nuclear Renaissance*. Those who specialize in policy matters might find the book's complex technical content a little difficult to grasp. However, the extensive use of pictures, diagrams, and charts is very helpful for readers who may be new to the technology of nuclear power.

The book's seventh chapter, on nuclear waste burners, includes discussions of the various technologies associated with spent-fuel management and provides valuable insight into the challenges that exist and their potential solutions. On the other hand, the coverage of nuclear fusion in chapter 9, although interesting, is probably not a legitimate topic to include in a discussion of a nuclear renaissance. Fusion might be part of the future but in all likelihood will not occur in the next 10 years.

I agree with the three fundamental policy issues that Nuttall identifies as crucial to a nuclear renaissance, but I believe gaining public acceptance is also critical and may rely on matters different from those issues. For example, the public must have confidence that nuclear power plant operators place a premium on protecting public health and safety, and that their concern extends to nuclear waste management. In that regard, Nuttall contrasts the difficulties of radioactive waste management that exist in the UK and the US to those that exist in Finland, with its policy and practices of transparency, community volunteerism, and local engagement. He correctly points out the need for scientists and politicians involved in the technical aspects of nuclear power to listen to the concerns of the public and address those concerns.

I note one technical error, on page 179. The helium outlet temperature from a high-temperature, gas-cooled reactor is 1560 °F, not 1560 °C. A dia-

gram on page 180 shows the correct temperature.

Overall, *Nuclear Renaissance* is well researched and well written and makes a valuable contribution to the debate on the future role of nuclear power.

Michael T. Coyle
Nuclear Energy Institute
Washington, DC

The End of the Certain World: The Life and Science of Max Born, the Nobel Physicist Who Ignited the Quantum Revolution

Nancy Thorndike Greenspan
Basic Books, New York, 2005.
\$26.95 (374 pp.).
ISBN 0-7382-0693-8

Nancy Thorndike Greenspan tells us that her biography of Max Born was inspired by conversations with his daughter Irene. The strengths and weaknesses of *The End of the Certain World: The Life and Science of Max Born, the Nobel Physicist Who Ignited the Quantum Revolution* may well be linked to the close association with the Born family that Greenspan formed while writing it. Among its strengths are the marvelous photos and the full use of the riches of the Born family archives. Indeed, access to those files has allowed Greenspan to write a double biography, of Max Born but also of his wife Hedwig (Hedi) Ehrenberg Born. But a weakness of the book—the somewhat petulant thesis that Born was never sufficiently credited for his contribution to the creation of quantum mechanics—may also derive from Greenspan's closeness to the Born family.

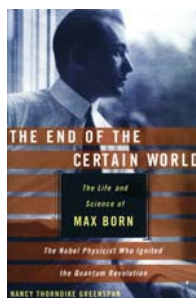
Greenspan gives two arguments for her claim that Born was slighted. The first is that the history of the formation of quantum mechanics was written mainly by physicists within the intellectual circle of Niels Bohr's Institute of Theoretical Physics at the University of Copenhagen. Greenspan argues that "not being a member of the Copenhagen circle, Born was omitted" (page 148). This strikes me as, at best, not proven. However, her second contention is more credible. It rests on her knowledge of Nobel Prize politics and on some meticulous work in the Nobel Prize archives and is a plausible account of why Born was not chosen to share the 1932 Nobel Prize

Tunable
Monochromatic
X-Rays

- >IMAGING SOURCES AND SYSTEMS
- UTILIZING OUR MULTILAYER OPTICS
- >SELECTABLE UP TO 60 keV
- >VARIABLE BAND-PASS CAPABILITY
- >HIGH FLUX, YET COST EFFECTIVE
- >USES COMMERCIAL ROTATING ANODE SOURCES
- >CUSTOMIZABLE TO YOUR SPECIFICATIONS

For more information, visit our website
at mxftech.com/welcome.htm
or e-mail us at sales@mxftech.com

MXF Technologies, Inc.



in Physics with Werner Heisenberg (pages 190–193).

The first nine chapters, roughly two-thirds of the book, deal with Born from his earliest years until 1933, when the Nazis suspended him from his Göttingen University professorship. Greenspan paints a vivid picture of what it meant to be Jewish in Germany in the 19th and early 20th centuries.

Born was in his early 20s when he began to focus on physics. We see him first in a 1905 summer seminar devoted to the recently discovered electron. Was it rigid or deformable? Was its mass mechanical or electromagnetic? Now Born began to encounter, one after another, developments in physics like relativity theory and Bohr's atomic model. As Greenspan tells us of his reaction and of his own groundbreaking work on lattice dynamics, she gives the reader a good sense of the evolution of pre-World War II physics. It is these nine chapters that I would recommend as ancillary reading for physics students. Greenspan makes limited use of Born's scientific papers when describing his physics: The publications she uses are mainly secondary sources. But she has supplemented her published sources with heroic work in archives, and her use of the letters, papers, and reminiscences of Born's contemporaries enriches and humanizes her narrative.

Born's wife, Hedi, first appears in chapter 3 when Born, at age 29, seeks a bride. On the basis of interviews with the Borns' children, she is described as self-indulgent (page 156). But the material Greenspan presents can also be interpreted as the story of a spirited woman who, unfortunately, was born at a time when marriage, whether love-based or loveless, was one of her few options. Hedi's journey to find love and outlets for her intelligence and energy strained the Borns' marriage. Born, however, worked tenaciously to preserve the relationship and by the time they were settled in Edinburgh in the late 1930s, Born could write of their life together as a "true loving marriage between old people" (page 219). Eventually, through Born's tenacity, they reconciled.

The final third of the book may be less interesting to PHYSICS TODAY readers. It is a year-by-year account of family events—both major and minor—from the arrival in 1933 of the

Borns in Cambridge, England, until Born's reception of the Nobel Prize in Physics in December 1954. (The 18 years until Born's death in 1970, and Hedi's two years later, are covered in a three-page epilogue.) The physics and philosophy of physics that Born did in those years is only touched upon and not well placed in the context of work by others. One also misses any attempt by Greenspan to summarize Born's personality or his political odyssey from German nationalist to socialist and to the conviction that one must "fight nationalism in whatever form it appears" (page 261). Without such a summary, Born's month-to-month moods and views, as Greenspan sketches them, can seem vacillating and capricious.

Many English-language biographies of physicists have been written by physicists or by historians whose life's work is the study of the development of physics. One thinks of Abraham Pais on Bohr and Albert Einstein, David Cassidy on Heisenberg, or Helge Kragh on Paul Dirac. Despite my criticisms, I stand in awe of how well Greenspan, a comparative outsider, has pulled off this biography.

Joan Lisa Bromberg
Johns Hopkins University
Baltimore, Maryland

Obsessive Genius: The Inner World of Marie Curie

Barbara Goldsmith
Atlas Books / W. W. Norton,
New York, 2005. \$23.95 (256 pp.).
ISBN 0-393-05137-4

Barbara Goldsmith's *Obsessive Genius: The Inner World of Marie Curie* aims to illuminate the personal side of the physical chemist, born Maria Skłodowska (1867–1934), and break through the legends, many of which were nurtured by Curie herself, that developed around the scientific icon. As one who was exposed to the myths in *Madame Curie* (Doubleday, Doran, 1938) by Curie's daughter, Eve, and in the 1943 film version starring Walter Pidgeon and Greer Garson, I am grateful for Goldsmith's balanced and realistic portrayal: The Marie Curie that emerges is passionate, tough, and flawed. Scientists and nonscientists alike will find much in the book to captivate their interest.

Although previous treatments of Curie's life tend to depict her as a victim, Goldsmith's version describes a more complex person. Curie suffered

New from Oxford!

THE PENDULUM

A Case Study in Physics
Gregory L. Baker and
Janice A. Blackburn

The Pendulum: A Case Study in Physics describes one physical system—the pendulum—and its manifestations in classical and modern physics. While being a technical work, this remarkable study is set within the context of the technological, intellectual and cultural developments to which the pendulum has contributed.

2005 809 pp.
0-13-058754-5 \$30.50

Forthcoming!

MODERN SUPERSYMMETRY

Dynamics and Duality
John Terning

This book provides a detailed survey of the modern developments in supersymmetry that are essential preparation for a graduate student or researcher intending to enter into particle theory or string theory.
(The International Series of Monographs on Physics #22)
March 2006 288 pp.
0-13-058760-9 \$100.50

WORLDS OF FLOW

A History of Hydrodynamics
from the Bernoullis to Prandtl
Olivier Darrigol

"This is another landmark work in the history of physics, a very important and substantial contribution."
—Peter Higgs, Professor of the History of Science, Lancaster University

2005 376 pp.
0-13-058790-8 \$79.50

SEMICONDUCTOR DETECTOR SYSTEMS

Helmut Spieler

"The history of this subject is not a linear sequence of events, which would lose the understanding of the physics of semiconductor detectors with the necessary introduction of these subjects. All the standard references are in this subject."

—Tony Whitham, University of Oxford
(Editor, *Semiconductor Science and Technology* #2)

2005 512 pp.
0-13-058784-5 \$189.50

OXFORD
UNIVERSITY PRESS

Prices are subject to change and apply only in the US.

To order, please call 1-800-851-7558.

In Canada, call 1-800-887-8221.

Never miss an Oxford title!

Add our e-mail alert to your e-mail.

Satisfaction guaranteed or your money back.