condescending, as it seems to imply a limited attention span; for others, it will inspire as intended. I recommend that instructors carefully evaluate the contents and approach of the textbook for themselves and for their students. An alternative text, Rodney Cotterill's *The Cambridge Guide to the Material World* (Cambridge University Press, 1985), succeeds in capturing the imagination while providing depth, albeit at the expense of breadth.

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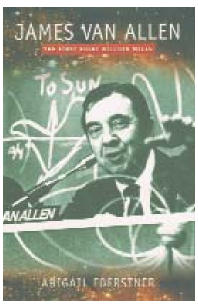
James Van Allen

The First Eight Billion Miles

Abigail Foerstner
U. Iowa Press, Iowa City, 2007. $37.50 (322 pp.). ISBN 978-0-87745-999-6

James Van Allen (1914–2006) has been one of the most widely recognized names worldwide for the past 50 years. Fame came soon after he and his team of scientists at the University of Iowa recognized that their "malfunctioning" Geiger counter aboard the *Explorer 1* satellite, launched on 31 January 1958, was actually performing properly but had been saturated by the intense flux of energetic particles trapped in Earth's magnetic field. Their understanding of what was happening did not come easily: It actually required data from a tape recorder aboard *Explorer 3*, which was launched on 26 March 1958. Van Allen announced the discovery of the "belts" of radiation at a meeting of the National Academy of Sciences and the American Physical Society on 1 May 1958 in Washington, DC. To the world those trapped energetic particles became known as the Van Allen radiation belts. Van Allen himself didn't use that term, but he was fond of noting around his house that the Van Allen belt held up his trousers.



Although the discovery of the energetic charged particles trapped in the geomagnetic field made him famous, Van Allen had been a leader in international cosmic-ray research for more than a decade and had been an important member of the team that developed the radio proximity fuse during World War II. Except for those of us steeped in the history of the Johns Hopkins University Applied Physics Laboratory, few people know much about Van Allen's work during the war. But Abigail Foerstner's *James Van Allen: The First Eight Billion Miles* provides a fine description of both his work and the global context for it. The subtitle refers to the fact that Van Allen's instrument on the *Pioneer 10* spacecraft had operated continuously just after launch in 1972 until the last signals from the spacecraft were received in 2003. During those 32 years *Pioneer 10* had traveled almost 8 billion miles. Although Van Allen's career has been well documented in a number of awards ceremonies and conferences, this book appears to be the first authorized biography.

Foerstner, a lecturer at the Medill School of Journalism at Northwestern University, has written an extraordinary book about one of the most influential scientists active during the last half of the 20th century. For more than six years, Foerstner had almost unlimited access to Van Allen's papers and journals; she also interviewed members of his family and dozens of his colleagues and former students. Most importantly, she had frequent and regular access to Van Allen himself. From her voluminous research, she has produced a fascinating story, beginning with his grandfather's move to Iowa in the 1860s. Van Allen's father, Alfred, was born in Mount Pleasant, Iowa, in 1869. He became a lawyer, joined his father's law firm, and was active in local government and politics. He began courting school teacher Alma Olney in 1907; she was 23 years old. They married in 1911, and Van Allen was the second of four brothers born during the first 10 years of their marriage. All four were raised to appreciate hard work, and to enjoy learning.

With the advent of satellites and space probes, space science became big science, with all the competition and politics that involves. Beneath his soft-spoken manner, Van Allen was a fierce competitor and a skilled negotiator in determining the course of the nation's space program. Those personal traits appear to have been inherited from his scholarly and disciplined ancestors.

Van Allen's experience in designing small and rugged electronic assemblies for the proximity fuse put him in good stead when he returned to his cosmic-ray research using German V2 rockets after World War II. He was a strong believer in keeping his instruments simple, reliable, and inexpensive; hence, he worked diligently to launch his detectors on ever smaller and cheaper rockets. He was instrumental in developing the Aerobee sounding rocket and the even cheaper rockoon, which used a balloon to launch a small rocket from high altitudes. As for the detectors themselves, it may be fair to say that he was unique in his ability to wring information from Geiger counters, detectors that were on the verge of obsolescence at the time of *Explorer 1*.

Throughout his career Van Allen was a champion of unmanned spacecraft and a critic of the manned space program. He did not denigrate the technology or excitement of manned spaceflight, just its effect on the budget for the unmanned program. Many of us planetary scientists agreed with him and are pleased that Foerstner has faithfully presented his views in her superb biography.

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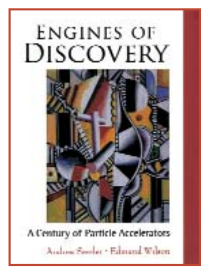
Engines of Discovery

A Century of Particle Accelerators

Andrew Sessler and Edmund Wilson
World Scientific, Hackensack, NJ, 2007. $65.00, $37.00 paper (194 pp.). ISBN 978-981-270-070-4, ISBN 978-981-270-071-1 paper

"His love for physics was legendary and infectious." That is how Andrew Sessler and Edmund Wilson describe Donald W. Kerst, one of many characters who appear in their *Engines of Discovery: A Century of Particle Accelerators*, a romance on the particle-accelerator saga. The sentence can be applied to the major and minor characters in the book, and to the authors themselves. Such description is what comes out of this beautifully illustrated and written history of particle accelerators. It is a book about physics that has no equations, one in which the story of the motivations for technological progress are entangled with the lives of the people who have witnessed the building, brick by brick, of particle accelerators—from the first electrostatic accelerator to the ambitious Large



Hadron Collider. Those bricks have been gigantic and small, yet all have been essential parts of an endeavor that has in the past century strongly influenced human progress.

Any other book on particle-accelerator history would have included the two authors because of their influence on US and European accelerator development. Sessler is a former director of Lawrence Berkeley National Laboratory; Wilson, a visiting professor at Oxford University, led the commissioning of the Super Proton Synchrotron and once headed the CERN Accelerator School. The need for higher-energy beams for fundamental research has been the major motivation for advances in particle accelerators. The idea of an accelerator was first discussed publically in 1928 when Ernest Rutherford, during his presidential address to the Royal Society of London, asked for a beam of charged particles more energetic than those produced by natural radioactivity. John Cockcroft and Ernest Walton picked up the challenge; in the Cavendish Laboratory, they invented the high-voltage generator that is named after them. Eighty years later the new generation of high-energy accelerators is being made possible with the participation of research groups from numerous laboratories and funds from all over the world. The complexity of the machines has allowed researchers to increase the energy of the particles by orders of magnitude.

Researchers' intellectual curiosity for fundamental physics laws has generated technical progress on a range of accelerator applications—from synchrotron radiation to cancer therapy to spallation neutron sources. The flexibility of the community of accelerator physicists is evident in its ability to apply the most innovative physics for a collider to the most reliable technology for a medical application. The authors show the path from fundamental physics to technology to application in the book's 11 chapters, each of which discusses a different type of particle accelerator. Each chapter provides a self-contained description of its particular device and follows an approximate chronological order, which allows readers to keep track of advances. The past, the present, and some hints of the future are described with scientific yet literary language.

Sidebars are dedicated not only to the people who made particle-accelerator history but also to some of the laboratories where they worked, suffered, and celebrated together in the pursuit of scientific progress. Sessler and Wilson mention the protagonists' joy for life, their interests besides physics, and their love for music, sports, and literature; thus the authors add brushstrokes of humanity to the historical panorama. Many of the book's subjects have been awarded national and international honors, including the Nobel Prize. Some of their achievements have received generous recognition; the contributions of others who have not been acknowledged find, in Sessler and Wilson's book, their place in the chronology. The book also honors projects that were unsuccessful because of economical, physical, or political reasons but were a step forward in the pursuit of knowledge.

For researchers working with particle accelerators, the book represents a family history. Many of us will find in its pages our teachers, friends, and colleagues, and the laboratories where we started our careers or lived our adventures in this fascinating field of particle-accelerator physics. Younger readers who are familiar with accelerator types and devices will come to know the scientists who long ago had the strength and courage to transform their ideas into reality. Thanks to the fresh and pleasant language that Sessler and Wilson use, *Engines of Discovery* should appeal to anybody interested in the history of scientific progress. The authors dedicate a special section to young people, encouraging them to join the teams for which particle-accelerator research is alive and challenging. With this book, the authors ensure that the enthusiasm that has led so many people to dedicate their lives to this branch of physics will continue to grow.

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Decoherence and the Quantum-to-Classical Transition

Maximilian Schlosshauer
Springer, New York, 2007. $99.00 (416 pp.). ISBN 978-3-540-35773-5

Almost a century after it first engaged physicists, the relationship between quantum mechanics and classical physics remains problematic. Early in the 20th century, Niels Bohr formulated the correspondence principle as a guide to help construct the laws of quantum theory. But until the 1980s there was scant experimental motivation for examining the physical mechanism of the