

A nuclear history replete with heroes and villains

The Age of Radiance The Epic Rise and Dramatic Fall of the Atomic Era

Craig Nelson
Scribner, 2014. \$29.99 (448 pp.).
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Reviewed by Alvin Saperstein

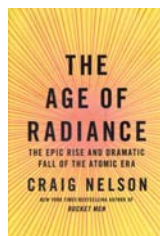
Craig Nelson's *The Age of Radiance: The Epic Rise and Dramatic Fall of the Atomic Era* covers the period from the 1895 discovery of x rays to the 2011 disaster at the Japanese nuclear power plant in Fukushima. Except for the occasional confusing sentence, the book is an interesting and well-written account of the impact of nuclear physics on society.

The Age of Radiance fulfills the Rise part of its subtitle, but it fails, I believe, in making a case for the Fall. Its later chapters give ample evidence for the continuing and pervasive role of x rays and radioactivity in medicine and daily life. Also, the author claims as a myth the statement that nuclear arms "are different from conventional weapons." But he contradicts that with illustrations showing that conventional weapons have always been used to fight wars, whereas nuclear weapons stockpiles have evolved to prevent them.

The author is not a scientist. He is a good professional storyteller who knows how to invoke aspects of the ordinary parts of the lives of his heroes and villains to capture his audience's attention and engagingly convey the development of the science and its effects on the world. I have taught physics courses, and included some historical and social aspects, for more than 50 years, and I have researched and published articles and books on nuclear physics and its implications for international security. Yet many historical and biographical facts presented in *The Age of Radiance*—certainly many aspects of the behavior of its heroes and villains—were new to me.

Among the villains is Edward Teller,

whose self-centered arrogance precluded him from positively contributing to the Manhattan Project. He concentrated instead on a fruitless search for the hydrogen bomb. That technology came into fruition with the ideas of Stanislaw Ulam, whose major contributions Teller initially denied. Teller then teamed up with another villain, Lewis Strauss—a vindictive commissioner on the Atomic Energy Commission and a hydrogen-bomb proponent who felt slighted by the way J. Robert Oppenheimer defended his concentration on



the atomic bomb—to publicly ostracize Oppenheimer as a Communist and a security risk. That resulted in Teller being shunned by almost the entire US physics community. Teller was also the main scientist behind Ronald Reagan's expensive drive for a high-tech defense against intercontinental ballistic missiles. That unsuccessful effort considerably delayed the start of actual nuclear disarmament by the US and the Soviet Union.

German chemist Otto Hahn is also considered a villain. He, along with physicists Lise Meitner and Fritz Strassmann, first detected the presence of barium and other intermediate-mass nuclei in a sample of uranium bombarded by neutrons. The significance of that discovery was only later recognized by Meitner (then a Jewish refugee in Sweden) and her nephew Otto Frisch. After World War II, Hahn claimed exclusive discovery of nuclear fission—with the "assistance" of Strassmann and Meitner. That claim was unfortunately accepted at face value by the Nobel Committee for Chemistry.

Meitner, Marie Curie, Enrico Fermi, and Leo Szilard are among the book's heroes. Among the other interesting people stories Nelson tells is one concerning the Hungarian quartet: Szilard, Teller, John von Neumann, and Eugene Wigner—all eminent scientists born in Budapest around the beginning of the 20th century. He also briefly discusses the Soviet equivalent of the Manhattan Project and the outstanding personalities involved. And scattered throughout the last chapters of the book are the names of many individuals, corpora-

tions, and government agencies important to the atomic era, but no "hero or villain" stories are told about them.

Many biographies of individual physicists exist, but *The Age of Radiance* is the first book I'm aware of that captures the personal aspects of several important scientists in a pleasant-to-read book. It also contains a complete index, an ample bibliography, many notes, and a number of photographs. General readers will not learn much physics, but they, and scientists too, will learn a great deal about the physicists who launched and maintained the atomic era.

The Cosmic Cocktail Three Parts Dark Matter

Katherine Freese
Princeton U. Press, 2014. \$29.95
(272 pp.). ISBN 978-0-691-15335-3

In her first popular science book, *The Cosmic Cocktail: Three Parts Dark Matter*, theoretical astrophysicist Katherine Freese lays out the current evidence for dark matter and dark energy and the status of the relevant experiments. Along the way to the most recent developments, she introduces the reader to the concepts necessary to understand the physics and relevance of the matter composition of the universe. Freese adds some historical facts, but the history of the field is not the main theme.



The Cosmic Cocktail is a relevant update to such well-known but now somewhat out-of-date books as Evalyn Gates's *Einstein's Telescope: The Hunt for Dark Matter and Dark Energy in the Universe* (W. W. Norton, 2009) and Dan Hooper's *Dark Cosmos: In Search of Our Universe's Missing Mass and Energy* (HarperCollins, 2006). Gates's and Hooper's books are more accessible than Freese's; she demands more of the reader but also gets across more scientific facts.

Not surprisingly, her chapter on WIMPs (weakly interacting massive particles) is excellent. Freese, a specialist in astroparticle physics, explains

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