BOOK REVIEWS | DECEMBER 01 2020

Manhattan Project: The Story of the Century. Bruce Cameron Reed. 567 pp. Springer, Switzerland, 2020. Price: $47 (hardcover) ISBN 978-3-030-45733-4. (Harry Bernas, Reviewer.) FREE

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Manhattan Project: The Story of the Century. Bruce Cameron Reed. 567 pp. Springer, Switzerland, 2020. Price: $47 (hardcover). ISBN 978-3-030-45733-4. (Harry Bernas, Reviewer)

Over 27 months during World War II, an extraordinary combination of intelligence, organization and sheer labor was assembled: about half a million people, from all walks of life, were involved in the Manhattan Project. They devised and built a means of obliterating life on our planet. In August 1945, it killed some 150,000 Japanese and injured an equal number in an especially ghastly way. The use of such a weapon changed relations among nations; the Project itself revolutionized relations between research, the military, and the economy, affecting their very nature worldwide.

Professor Reed, a very experienced physicist, teacher, and writer (and assistant editor to this journal), clearly has detailed knowledge, gained over 25 years, of every stage of the experimental work leading to the two final (uranium gun-type and plutonium implosion) weapons. He has read all the literature and learned (often first-hand, I gather) most of the anecdotes. In a recent undergraduate-level textbook [*The History and Science of the Manhattan Project*, Springer (2019)], despite the grisly nature of its subject, he successfully built an unusual, imaginative and effective physics course around the atomic bomb's science and technology, providing the reader with historical context as he proceeded.

This book is not part of a textbook series; equations have been removed and concepts are simplified. Reed calls it an attempt to provide "an authoritative treatment of the Project by a professional physicist." For whom? Despite its 450-odd pages and informative addenda, it makes no pretense at a critical history, nor does it provide explanations or justify decisions. I imagine a group by the fireside, a competent physicist holding forth on the topic before a composite audience of bemused (say, first-year college level) laypersons and some physics undergraduate or/and high-school teacher eager to delve into details here and there at various stages.

Much of the book is entertaining storytelling. It opens with a brief, useful historical outline relevant to the future discovery of fission [a bit too brief: Fermi was indeed a genius, but "artificial" (induced) radioactivity was discovered by Joliot-Curies, who earned a Nobel Prize for it in 1935]. The hesitant trail to fission and the bumpy path to the setting up of the Manhattan District are described at length. Readers familiar with books such as Rhodes's [*The Making of the Atomic Bomb*, Simon and Schuster (1986)] won't learn much, but it provides a nice summary for others (including teachers), and the story is fascinating. The German facet of it is unfortunately treated in a separate chapter at the book's end, obscuring the tension of close competition at the outset and the reasons for the Germans' ultimate failure.

Then, we follow the timeline of the Project, with an accent on its Los Alamos component. For a physicist, this is the more interesting part of the book. Reed necessarily glosses over some problems, but details how major difficulties (e.g., gaseous diffusion and electromagnetic racetracks for isotope separation) were overcome, or how entirely novel systems—the first working fission reactor, the first Pu-producing reactor, and the huge Hanford site for Pu production and separation—were set up and run. At times, one almost hears him excitedly going into technical details. The physicist listener is happy; the layman is lost; but Reed returns to the adventure story and pursues.

The first ("Trinity") bomb test is detailed in a physics perspective. The latter part is short on the Hiroshima and Nagasaki bombings but provides useful context (Truman's announcement, policy statements) and quotes from Japanese victims. The Epilogue refers very briefly to post-Manhattan history. As though the story was over and the fire was out.

But it's not, as we know. The participants of the Project were not single-minded. As the Project was reaching fruition, questions arose regarding the very pursuit of the mission and the dropping of the bomb, not just among leaders (Reed's recalling the Jeffries committee's work is commendable), but also among the rank-and-file. Oppenheimer's role in first pushing for the use of the bomb, and his (and colleagues' Fermi, Lawrence, and Compton) change of heart after the Nagasaki bombing are not mentioned. Was the Bomb, and its use, truly a means of avoiding all future wars? Hesitations and self-contradictions revolved around that essential dilemma, at all levels, during the Project and long after. I miss them very much in an otherwise interesting book.

"War and diplomacy up to 1945 [were] the extension of each other. At one stroke the atomic bomb […] made the avoidance of total war the prime goal of diplomacy [and] the nations … recognized technology itself as a principal foundation of national power and diplomatic influence," wrote a U.S. Congress Committee in 1977. The crucial changes ultimately affecting relations among nations, the world economy, and role of science were wrought during the Manhattan Project. We still live under the shadow, and we all need to understand.

Harry Bernas is Research Director (emeritus) at "Centre de Sciences Nucléaire et Sciences de la Matière" CNRS-University of Paris-Saclay, Orsay (France). His main areas of research are nanoscience and materials science. In the last ten years, he has also been involved in studies of recent nuclear science history.

BOOKS RECEIVED

Gravitational Few-Body Dynamics: A Numerical Approach. Seppo Mikkola. 244 pp. Cambridge U. P., New York, 2020. Price: $140 (hardcover) ISBN 978-1-108-49129-7.

Manhattan Project: The Story of the Century. Bruce Cameron Reed. 567 pp. Springer, Switzerland, 2020. Price: $47 (hardcover) ISBN 978-3-030-45733-4.

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