BOOKS

Bethe and Oppenheimer: Comparison and Contrast

In the Shadow of the Bomb: Bethe, Oppenheimer, and the Moral Responsibility of the Scientist

Silvan S. Schweber
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Reviewed by Sidney D. Drell

Hans Bethe and J. Robert Oppenheimer have two of the most extensively chronicled lives among US physicists of the second half of the 20th century. Their distinguished scientific careers as researchers and as mentors have been thoroughly documented. The major roles they played in the development of US nuclear weapons and policy choices for dealing with the dangers those weapons created, as well as their public involvement during times of Senator Joseph McCarthy and the "red scare" in the 50's, have been widely reported and analyzed. The novel emphasis in *In the Shadow of the Bomb*, by Silvan Schweber (a theoretical physicist turned historian of physics), is on the contrasting cultural backgrounds of Bethe and Oppenheimer. Schweber argues in this slim volume that one can find in their different backgrounds causal links to their different moral outlooks and approaches to policy and science after World War II, including their behavior in prominent security investigations: Bethe in the Phillip Morrison investigation and Oppenheimer in Bernard Peters's.

Bethe, grounded in the classical German tradition of the Wilhelm von Humboldt *Bildung* that emphasized character formation and the moral dimension of education, ended up the more independent scientist, with inner confidence and strength. Oppenheimer, on the other hand, was a product of the Ethical Culture School of Felix Adler in New York, which emphasized social involvement in efforts to improve the world.

Bethe, the greater of the two as a physicist, is clearly the author's hero, and Schweber presents a strong and affectionate portrait of him in this book, which started as a chapter of a comprehensive biography (still in progress) that Bethe invited him to write. Oppenheimer emerges as a more tortured person who struggled in the turbulent political tides of the post-WWII years under self-imposed constraints on his independence, because of his involvement as an adviser to the government at the highest levels. Bethe's inner strength and independence are portrayed as strong assets in his defense of Morrison, his colleague at Los Alamos and Cornell, who came under attack by the Congressional Un-American Activities Committee during the 1950s. Oppenheimer, on the other hand, wavered in his character judgments of Peters and proved damaging to Peters's cause. Schweber explores the thesis that Oppenheimer's role reflected his own weaknesses and his efforts to protect his position within the high counsels of government, especially in view of his own pre-Los Alamos political activities, which came under suspicion during the security hysteria of the 1950s.

In the end, Bethe, with his phenomenal prowess in mastering both fundamental and applied physics problems (he has been described as a dreadnought steaming directly forward in his scientific endeavors), proved to be the stronger and more effective public voice. He became—and endures as—a leading scientific statesman on strategic issues of war and peace, particularly those involving nuclear weapons and the concept of deterrence. Oppenheimer turned in 1947 from research to administration, as director of the Institute of Advanced Study, where he created a great center of theoretical physics. He lost his security clearance after a notorious investigation that questioned his reliability and loyalty—one of the most disgraceful chapters in this country's witch-hunt history.

Schweber is to be commended for pulling together, with comprehensive referencing, many of the relevant events in the interlocking sagas of Oppenheimer and Bethe during those turbulent times. His book concludes with a lightning tour through some of the debates over the US decision to build the hydrogen bomb and subsequent efforts to ban nuclear weapons tests—a topic that remains on the arms control agenda in 2000. Bethe is the dominant figure in this volume, and Schweber knows and describes him well. I look forward to reading the full Bethe biography.

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Physics with Tau Leptons

Achim Stahl
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The tau lepton has been a continuous source of both pleasure and frustration to physicists since its discovery twenty-five years ago. The first pleasure came from the discovery of this very heavy charged lepton: mass 1777 MeV/c^2, seventeen times the mass of the muon and thirty-five hundred times the mass of the electron. The next pleasure came from the realization that the tau was a member of a new generation of elementary particles. And the continuing pleasure has come from the beautiful physics of the more than one hundred decay modes of the tau: the comparison of experiment with theory. The two purely leptonic decay modes, in which the tau decays to an electron and two neutrinos, or to a muon and two neutrinos, should be completely understood using weak interaction theory. The many decay modes in which the tau decays to hadrons—decays to pions plus a neutrino for example—teach us a great deal in a very direct way about the strong interactions of hadrons.

The frustration associated with the tau lepton comes from the disappointment of hopes that its comparatively large mass, with its concomitant large