

Preface

At the age of 97, Hans Bethe asked his long-term collaborator, Gerry Brown, to explain his physics to the world. A glance at Hans Bethe's published legacy — almost eight decades of original research, hundreds of scientific papers, numerous books, countless reports spanning the key areas of twentieth-century physics — is sufficient to realise that this was no mean task. In answering Bethe's request, the editors enlisted the help of experts in the different research fields, collaborators and friends of this “last giant” of twentieth-century physics. *Hans Bethe and His Physics* is the result, and while the book's primary aim was to explain the science behind the man, the different contributions also allow the reader to take a glimpse at the man behind the science.

The book consists mostly of papers and articles written and published previously in appreciation of the work done by Hans Bethe. It is divided into four parts. Part 1 contains papers by colleagues and friends who, over shorter or longer periods of time, had the opportunity to see Hans Bethe at work at close range. In “Hans Bethe and His Physics,” Gerry Brown summarises and evaluates Hans Bethe's long career as a researcher and throws light on their collaborative efforts in the last decades of the twentieth century. “My Life in Astrophysics” is a paper initially written by Hans Bethe in 2003 as a personal reminiscence of more than six decades of research in astrophysics, work that included, among others, his discovery of the CN cycle which would earn Bethe the Nobel Prize in 1967.

For the last 25 years of their collaboration, Gerry Brown and Hans Bethe spent the month of January together at some University on the west coast, often at Caltech, but sometimes at Santa Barbara or Santa Cruz. Chris Adami, in “Three Weeks with Hans Bethe” reflects on a short period when, in 1992, for the first time he joined the two professors during their annual

research gathering. The piece consists of detailed notes taken by Adami at the end of each day recalling the conversations — often at mealtimes — that had taken place throughout the day. They present a rare opportunity to see Hans Bethe through the eyes of an “intellectual grandson,” and they demonstrate the powerful impression Hans Bethe left with those who had the chance to learn from him in such close proximity. Jeremy Bernstein, in “Hans Bethe at *The New Yorker*”, recalls the story behind his profile of Hans Bethe in *The New Yorker*, the basis of his later biographical sketch *Hans Bethe, Prophet of Energy*. Ed Salpeter’s acquaintance with Hans Bethe went back to the immediate post-war years, when he first encountered his future postdoctoral adviser as a graduate student under Rudolf Peierls at Birmingham. In “My Sixty Years with Hans Bethe,” Salpeter, by looking at the way Bethe impacted upon his own development as a scientist, dwells on the formative influences of Bethe as researcher and as a teacher, tracing those back to the latter’s own teachers, Arnold Sommerfeld and Enrico Fermi.

Part 2 of this volume consists of the introduction and five papers reprinted from a special issue of *Physics Today*, in which guest editor Kurt Gottfried asked a number of colleagues to commemorate Hans Bethe’s contribution to twentieth-century physics. After Gottfried’s general appreciation of Bethe’s work, Silvan Schweber writes about the period preceding the Second World War. The four other papers in this section deal with four distinct aspects of Bethe’s work. The late John Bahcall and Ed Salpeter discuss Bethe’s work on energy production in stars, nuclear astrophysics and neutrino physics; Freeman Dyson traces Bethe’s influence on the development of quantum electrodynamics; John Negele analyses Bethe’s work on the theory of nuclear matter and in particular his post-war contribution to understanding the nuclear many-body problem; and Gerry Brown presents a picture of his collaboration with Hans on supernovae and other astrophysical topics in the last quarter of the twentieth century.

Part 3 contains papers which investigate further areas of Hans Bethe’s research and teaching interest. C. N. Yang and Mo-Lin Ge, in “Bethe’s Hypothesis” sketch the origins and impact of what Yang himself had termed the “Bethe Ansatz.” The other three papers deal with three of the key areas of Hans Bethe’s scientific activity. Starting off as a solid state physicist with his first publications in 1927, Bethe moved the focus of his attention towards nuclear physics to solid-state physics in the early to mid-1930s, but he continued to make substantial contributions into the early post-war years. N. David Mermin and Neil Ashcroft look back on the first twenty years of Bethe’s scientific activity investigating just how influential a

solid-state physicist Hans Bethe was throughout the 1930s. Jeremy Holt and Gerry Brown, after a tour de force of the history of nuclear physics, put Hans Bethe's contributions to our understanding of the nuclear many-body problem into their historical context. Finally in this section, and appropriate as a conclusion to Hans Bethe's achievements, is "And Don't Forget the Black Holes," a paper which he co-authored with Gerry Brown and Chang-Hwan Lee shortly before his death, in 2005. As much of his work during the last quarter of a century of his life it was on astrophysics phenomenon.

The final part contains papers which go beyond a discussion of Hans Bethe's contribution to scientific progress in the twentieth century. They describe why Bethe, notwithstanding his outstanding mathematical and scientific powers, had such a huge impact on public policy. Sidney Drell, in "Shaping Public Policy," recounts the various ways in which Hans Bethe made his voice heard, be it in defence of beleaguered colleagues during the McCarthy Era, be it within the scientific community when difficult choices about the direction of research had to be made, or be it in his role as adviser to US Governments and Presidents, convincing them of the folly or wisdom of different policy options. Boris Ioffe examines Hans Bethe's stance of ways to solve the global energy problems, one of the latter's main political concerns. While Bethe had always been a staunch supporter of nuclear disarmament, he had, at the same time, advocated the peaceful use of nuclear energy, a position which he never tired to explain and which Ioffe takes up in his description of Bethe's views on nuclear power. Finally, obituaries by Richard L. Garwin and Frank von Hippel and Kurt Gottfried respectively demonstrate once more Bethe's outstanding qualities as a scientist and human being alike.

May 2006

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