

Heisenberg: the man and his physics

Nicholas Kemmer

Werner Heisenberg: Collected Works, Series B.

Edited by Walter Blum, Hans-Peter Dürr and Helmut Rechenberg.

Springer-Verlag: 1984. Pp.937. DM108, \$38.

Inner Exile: Recollections of a Life with Werner Heisenberg.

By Elisabeth Heisenberg.

Birkhäuser: 1984. Pp.170. SwFr. 38.

BY THE time Werner Heisenberg had reached his twenty-fifth birthday he was already a leading figure in the world of theoretical physics. His greatest achievements date from his young days, but he continued to do most important work in a great variety of fields of physics for many years and was still working on deep problems until quite close to his death. He was the teacher of numerous top-rank physicists and a highly skilled expositor in lectures, books and articles, not only within physics but also on many other subjects, among which philosophy had an important place.

Editing his collection of works is an enormous task, not yet completed, and the present volume is the first of several. It forms the whole of Series B, to be sandwiched between the multi-volume Series A (primary scientific publications, also published by Springer) and Series C (works outside physics, published by R. Piper, Munich). In this volume works of an expository nature have been brought together: books, articles in symposium volumes and journals, public lectures, right down to remarks in conference discussions. Every piece of material is reproduced as it first appeared (in some cases in typescript with handwritten equations) except that everything originally of large format has been reduced, sometimes to the detriment of legibility. Items appear in German, English, French and, in one case, Dutch.

For a non-specialist this volume provides an easier survey of the vast range of scientific knowledge we owe to Heisenberg than will Series A. In the first half or so, the branches of physics covered are remarkably varied and reveal interesting links between apparently unrelated fields. However in the latter half almost all the material is concentrated on one topic, Heisenberg's Unified Theory of Elementary Particles which he single-mindedly started to develop 30 years ago in collaboration with a small number of colleagues. This work continued parallel with and, up to a point, in full cognizance of the rapidly changing knowledge being accumulated elsewhere, but it has not as yet been accepted as valid by physicists in general. A very

relevant insight into the situation as it stood in 1958 is provided on p. 563 by Heisenberg's report on his theory and the ensuing strongly critical discussion led by Wolfgang Pauli.

Brief mention should also be made of the few pages in this volume taken from post-war publications (produced under American auspices) about the lines along which work in Germany, aimed at the utilization of fission energy, had proceeded under Heisenberg's direction. As references to details of that research are exclusively to unpublished wartime reports, the information provided is rather limited. However what we do learn of the story links up with the second book reviewed here.

The German original of *Inner Exile* was presented to me by a friend. I could not resist reading it immediately from cover to cover. In it Elisabeth Heisenberg reveals

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At home — Werner Heisenberg in 1947, at Göttingen, where after the war he became director of the Max Planck Institute for Physics.

herself as a gifted and sensitive writer with a wonderful skill in the use of her native language. The translators could not have been expected to match the rich quality of the original prose, but I did not find any serious faults in their work, except for one glaring mistranslation that touches on something of importance. In an early passage telling of her husband's boyhood, the author quotes a word used by a colleague to describe occasional bouts of hot temper. This word, "Blutausch", is rendered as "bloodlust". The passage indicates that Mrs Heisenberg does not depict her husband as a saint, but the English word would imply a streak in his character that is diametrically opposite to what she would wish to convey. This book need not be seen as putting to rest all controversy about Heisenberg's personality, but it is a pity that this small word should slip in, fitting as it does the vocabulary of his meanest detractors.

The aim of the book is to relate how Heisenberg, after much conflict, decided not to emigrate from Germany after Hitler's rise, even though he detested Nazism and suffered and was endangered

personally for failing to support "German Science". We are told how and why he concluded that his place was in his home country.

I prefer the German title of the book (*Das politische Leben eines Unpolitischen*) to the English one with its slight element of pre-judgement which the book otherwise does not demand of the reader. The excellent introductory chapter by Victor Weisskopf expresses most sympathetically how a sensitive and complex personality such as Heisenberg's would suffer under the pressures upon him. To an infinitely lesser extent, I experienced them myself. Nevertheless I do not think that the book will be seen as the final word on this piece of history. After all, today — 40 years after the Hitler nightmare ended — I think I am not alone, having re-built most happy personal contacts in Germany, in having buried deep inside me residues of old sores and bitterness that will not be wiped away. They re-emerge, for instance, when I am reminded of the way a formerly close colleague of Heisenberg's returned from a post-war reunion in deep distress — a gulf remained unbridged.

In the book we are told of a war-time meeting between Heisenberg and Bohr, and of a disastrous failure of communication between them. A brief account of the same event is given by Heisenberg in his autobiographical work *Der Teil und das Ganze* (published by Allen and Unwin in 1971 as *Physics and Beyond* — another distorted title!). The greatest part of that book consists of reconstructions in dialogue form of thoughts shared, developed and deepened by the author with Bohr, Pauli, Dirac and many others. As a way of conveying these ideas the presentation is attractive and absorbing; nowhere is it claimed that the mumbling Bohr, the laconic Dirac or the sharp-tongued Pauli could actually have spoken like that — nor written the same story. I wish I could have seen a version by Niels Bohr of that war-time meeting with Heisenberg.

These thoughts came to me when I was reading the last few pages of Elisabeth Heisenberg's book. There she mentions "bitter scientific quarrels" between Heisenberg and Pauli over the Unified Theory. After Pauli's death they were touched on by Heisenberg in a short memorial lecture given at a meeting in Trieste (unfortunately not included in the published proceedings of that event). There he linked Pauli's abrupt turning away from his own ideas to the onset of the latter's terminal illness. This view brought about an emphatic contradiction from my dear teacher, the late Gregor Wentzel. It is not recorded, but I can vouch for it. This is but a minor point — yet it is a fragment of historical disagreement that I think is worth recording. □

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