

# Grete Hermann – Between Physics and Philosophy

Edited by Elise Crull and Guido  
Bacciagaluppi



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# Grete Henry- Hermann: Philosophie – Mathematik – Quantenmechanik. Texte zur Naturphilosophie und Erkenntnistheorie, mathematisch-physikalische Beiträge sowie ausgewählte Korrespondenz aus den Jahren 1925 bis 1982

Edited by Kay Herrmann

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REVIEWED BY ANDREA REICHENBERGER

In a letter to Grete Hermann dated July 9, 1936, Werner Heisenberg expressed his regret at not being able to attend a conference in Heidelberg to which she had invited him, owing to his enlistment in the German Wehrmacht. Hermann was deeply disappointed, and in her reply, she condemned Heisenberg's sympathy with the National Socialists. For her, any form of cooperation with the Nazis was unacceptable and was to be considered a betrayal of humanity.

Today, the correspondence between Hermann and Heisenberg is preserved at the Friedrich Ebert Foundation's Archive of Social Democracy, in Bonn. Recently, Kay Herrmann, who is the editor of the book *Grete Henry-Hermann: Philosophie – Mathematik – Quantenmechanik*, published several letters from the archive, including the above-mentioned ones.

Grete Hermann (1901–1984) (sometimes Grete Henry or Henry-Hermann after her marriage in 1938) was a renowned philosopher and a distinguished quantum physicist. She studied mathematics at the University of

Göttingen under Emmy Noether and Edmund Landau, obtaining her doctoral degree in 1925. From 1925 to 1927, Hermann worked as a private assistant to the mathematician, philosopher, and socialist Leonard Nelson (1882–1927). Together with Minna Specht (1879–1961), a fellow socialist, she posthumously published Nelson's works. In 1934, Grete Hermann went to Leipzig University, where she collaborated with Carl Friedrich von Weizsäcker and Werner Heisenberg. In June 1936, Hermann, along with Eduard May and Thilo Vogel, was awarded the Richard Avenarius Prize by the Academy of Sciences of Saxony in Leipzig for her work at the intersection of quantum physics and philosophy.

Two highly informative books on Grete Hermann have recently been published. Both are a tribute to Hermann's legacy as a first-rate mathematician and physicist, a humanist and educationalist, a politically active socialist, and, above all, a critical philosopher. One of the books, edited by Elise Crull and Guido Bacciagaluppi, bears the title of the workshop *Grete Hermann: Between Physics and Philosophy*, which was held at the University of Aberdeen in May 2012. The volume is divided into four essential chapters, which we review in the following.

Chapter 1 consists of contributions by Inge Hansen-Schaberg, Fernando Leal, and Giulia Paparo. Hansen-Schaberg's article discusses various aspects of Hermann's life, such as her early career, her relationship with Nelson and Specht, her political resistance against the Nazi regime, her emigration period, and her return to Germany after the war. Hansen-Schaberg succeeds in tracing Hermann's life in a highly exciting way while remaining strictly objective. Leal compares Hermann's Neo-Kantian philosophy with Nelson's approach. Paparo's contribution is titled "Understanding Hermann's Philosophy of Nature." Both Leal and Paparo emphasize Hermann as an independent thinker who was much more liberal and less dogmatic than Nelson.

Chapter 2 is a fundamental part of the book. It focuses on Hermann's philosophy of quantum physics and begins with Léna Soler's article "The Convergence of Transcendental Philosophy and Quantum Physics: Grete Henry-Hermann's 1935 Pioneering Proposal." Instead of postulating the existence of hidden variables that determine the unique cause of each effect, Hermann attempted to find a way to save the Kantian category of causality, while on the other hand "accepting, with Bohr and Heisenberg, the definitive character of statistical predictions."

Next, Thomas Filk investigates the impact of Carl Friedrich von Weizsäcker on Grete Hermann, focusing on "Heisenberg's microscope." In his draft paper explaining his uncertainty principle, Heisenberg had described a thought experiment that would allow us to use visible light to observe a particle on the basis of the principles of classical optics. This thought experiment was later called "Heisenberg's microscope," or "gamma-ray microscope." The problem was that the "experiment" pretends that quantum uncertainty can be explained by an imaginary classical mechanical interaction. In the first years of interpreting quantum mechanics, Heisenberg and Niels Bohr

thought that uncertainty was epistemic, i.e., the result of our inability to measure accurately. In the wake of discussions about the Einstein–Podolsky–Rosen experiment, Bohr changed his mind and announced that “uncertainty” was an intrinsic “indeterminacy.” Filk concludes that Hermann comes very close to the Einstein–Podolsky–Rosen-type argument (EPR), but she does not seem to realize the point that EPR later made, “that both location and momentum of the electron must be ‘elements of reality.’”

Mélanie Frappier argues that Grete Hermann’s discussion allows a novel interpretation of Heisenberg’s microscope thought experiment in the sense of Nelson’s Socratic method. Michiel Seevinck continues the debate on Hermann’s criticism of von Neumann’s theorem against the possibility of hidden variables.

Chapter 2 ends with “Grete Hermann’s Lost Manuscript on Quantum Mechanics,” by Elise Crull and Guido Bacciagaluppi. They analyze in detail her work that dates back to 1933. Prior to her extended stay in Leipzig and her 1935 essay on the foundations of quantum mechanics, Grete Hermann had written a manuscript on determinism and quantum mechanics (1933). Crull and Bacciagaluppi compare this text with the 1935 essay and contextualize it within the framework of Niels Bohr’s complementarity principle. Bacciagaluppi argues

that Bohr associated causality with the conservation theorems, and thus expressed the view that causality and the space time picture were complementary. For Hermann, instead, both the application of the conservation theorems and that of the idea of space location allow one to tell causal stories.

Crull reads Hermann’s 1935 paper as a Kantian interpretation of Bohr’s complementarity and correspondence principles in the light of “the Friesian/Nelsonian understanding of Kant’s categories as analogies.”

Chapter 3 presents a transcription of the panel discussion of the Aberdeen workshop (with the panelists Dieter Krohn, Rene Saran, and Fernando Leal). In Chapter 4, Hermann’s essays “Determinism and Quantum Mechanics” (1933) and “Natural-Philosophical Foundations of Quantum Mechanics” (1935) are translated into English for the first time. A letter from Gustav Heckmann to Grete Hermann is also included.

Needless to say, Elise Crull and Guido Bacciagaluppi have provided an important contribution to the history and philosophy of quantum mechanics. Their book not only brings a female philosopher and scientist into the spotlight, but sheds new light on early philosophical discussions on quantum mechanics. Regrettably, the publication has a few shortcomings. First, the publication provides insights only into those works of Hermann that are already more or less well known. Many topics are not covered, for example Grete Hermann’s dissertation under Emmy Noether, her

critical examination of the so-called Gestalt theory, or her philosophy of ethics. Secondly, the translations of German texts have some deficiencies. For example, it is misleading to translate the German phrase “Anschauungen der kritischen Philosophie” as “intuitions of critical philosophy.” The correct translation of “Anschauungen” should rather be “views,” “ideas,” or “conceptions.” Thirdly, the contributed papers differ in quality, and some assertions and interpretations should be read with caution. For instance, Thomas Filk’s criticism presupposes the notion of the Einstein–Podolsky–Rosen “element of reality” without sufficiently explaining what it means.

The other book on Grete Hermann, in German, is edited by Kay Herrmann. It is much more extensive than the previously discussed book in English. Chapter 1 consists of seven research studies on Grete Hermann. Giulia Paparo and Kay Herrmann analyze the relationship between Hermann’s philosophy of quantum mechanics and transcendental idealism. Inge Hansen-Schaberg sheds new light on Grete Hermann’s political activism. Peter Ullrich and Karl-Heinz Kiyek investigate from a contemporary perspective Hermann’s doctoral thesis, “Die Frage der endlich vielen Schritte in der Theorie der Polynomideale” (“The question of finitely many steps in polynomial ideal theory”). Caroline Littlejohn Herzenberg and Dieter Suter focus on Grete Henry-Hermann’s philosophy of quantum mechanics and her criticism of von Neumann’s proof. Compared to the contributions in the English volume, the papers in the German edition are in general based on better-researched material, and some of them discuss topics that have previously received little attention. Even so, certain contributions are weak in terms of content and scope. For instance, Suter’s article is hardly about Hermann’s philosophy at all.

Chapter 2 contains reprints of Grete Hermann’s scattered writings on mathematics, physics, natural philosophy, and epistemology with a special focus on quantum mechanics. Hermann’s critical comments on Moritz Schlick and Karl R. Popper are especially noteworthy. There are two hitherto unpublished manuscripts: a study on Bernhard Bolzano (1926) and “Determinism and Quantum Mechanics” in the original German version (1933).

Chapter 3 reproduces letters from 1933 to 1982, for instance correspondence between Hermann and Heisenberg, von Weizsäcker, Paul Bernays, Julius Kraft, Adolf Kratzer, Wilhelm Ackermann, and Bartel Leendert van der Waerden, among others. Chapter 4 contains the late Helmut Rechenberg’s essay about Heisenberg, Michael Drieschner’s article about von Weizsäcker, and two reviews by Carl Friedrich von Weizsäcker about Hermann’s writings.

In conclusion, Kay Herrmann’s edition is a precious treasure trove for all those interested in expanding their horizons regarding Grete Hermann and her critical philosophy. Unfortunately, this edition does not meet the

standards of a critical edition. For example, explanatory footnotes and an index are lacking. Several mistakes are strikingly noticeable, for example, the incorrect title “Quantenmechanik und Determinismus” instead of “Determinismus und Quantenmechanik.” The world has yet to see a fully comprehensive overview of Hermann’s work and its impact, although Elise Crull, Guido Baccigaluppi, and Kay Herrmann have succeeded in setting a milestone in this respect.

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