Joint DPG and EPS History of Quantum Physics Symposium (SYHQ)

jointly organised by
the German Physical Society (DPG) and
the European Physical Society (EPS)

Arne Schirrmacher
Wissenschaftsgeschichte
Institut für Geschichtswissenschaft
Humboldt Universität zu Berlin
Unter den Linden 6
10099 Berlin
Arne.Schirrmacher@hu-berlin.de

Karl Grandin
Center for History of Science
Royal Swedish Academy of Sciences
Lilla Frescativägen 4A
114 18 Stockholm
Karl.Grandin@kva.se

On the occasion of the centenary of quantum mechanics and in conjunction with the Historic Site award of the EPS for Göttingen, a symposium on the history of quantum mechanics is held at the the DPG Spring Meeting in Göttingen.

Overview of Invited Talks

(Lecture hall ZHG010 and Forum Wissen)

Plenary Talk

PV II	Mon	12:15–13:00	ZHG011	**The Role of Applications in the History of Quantum Mechanics** — •Christian Joas

Invited Talks

SYHQ 1.1	Mon	9:00– 9:30	ZHG010	**Heisenberg's Umdeutung** — •Alexander Blum
SYHQ 1.2	Mon	9:30–10:00	ZHG010	**Representing quantum physics: The role of notation in the construction of quantum mechanics** — •Arianna Borrelli
SYHQ 1.3	Mon	10:00–10:30	ZHG010	**The Nobel committee's position on quantum mechanics: Nominations, evaluations and decisions** — •Karl Grandin
SYHQ 2.1	Mon	14:00–14:30	ZHG010	**Model and Target: Von Neumann's Mathematische Grundlagen** — •Michael Stöltzner
SYHQ 2.2	Mon	14:30–15:00	ZHG010	**Tracing the dissemination of quantum mechanics: A comparative approach** — •Roberto Lalli
SYHQ 2.3	Mon	15:00–15:30	ZHG010	**Quantum Mechanics and 'Aryan Physics'** — •Mark Walker
SYHQ 3.1	Mon	16:00–16:30	Forum Wissen	**Women in the History of Quantum Physics** — •Margriet van der Heijden
SYHQ 3.2	Mon	16:30–17:00	Forum Wissen	**Molecular WiHQP Vignettes: Hertha Sponer and Elizabeth Monroe** — •Patrick Charbonneau
SYHQ 3.3	Mon	17:00–17:30	Forum Wissen	**Grete Hermann: A pioneer of the philosophical debate about the foundations of quantum mechanics and a political activist** — •Andrea Reichenberger

Sessions

SYHQ 1.1–1.3	Mon	9:00–10:30	ZHG010	**History of Quantum Mechanics I: Revolution, Representation, Reevaluation**
SYHQ 2.1–2.3	Mon	14:00–15:30	ZHG010	**History of Quantum Mechanics II: Foundation, Dissemination, Politicization**
SYHQ 3.1–3.3	Mon	16:00–18:00	Forum Wissen	**Women in the History of Quantum Mechanics: The Project and its New Insights**
SYHQ 4	Tue	18:00–21:30	Aula am Wilhelmsplatz with broadcast to ZHG010 and ZHG011	**EPS historic site event**

SYHQ 1: History of Quantum Mechanics I: Revolution, Representation, Reevaluation

Time: Monday 9:00–10:30 Location: ZHG010

Invited Talk SYHQ 1.1 Mon 9:00 ZHG010
Heisenberg's Umdeutung — •Alexander Blum — LMU München

What did Heisenberg actually think he was doing when he constructed the foundations of matrix mechanics in May/June 1925? Later on, he would famously (and vehemently) argue for a probabilistic interpretation against Schrödinger. But in the summer of 1925, months before Schrödinger would publish his wave equation, Heisenberg's interpretation was far more tentative and far more concerned with aspects of spectroscopy. In my talk, I will analyze what meaning Heisenberg initially ascribed (and didn't ascribe) to the matrix elements in the theory he was building.

Invited Talk SYHQ 1.2 Mon 9:30 ZHG010
Representing quantum physics: The role of notation in the construction of quantum mechanics — •Arianna Borrelli — Technische Universität Berlin

The relationship between physical notions and the mathematical structures expressing them is an issue of primary importance in the history and philosophy of science. Historical evidence suggests that, when investigating the relationship between physics and mathematics, one should pay attention to the notations mediating it: spoken or written words, drawings, symbols and more. The history of quantum mechanics offers a very good example of how new physics and new mathematics can emerge as one, and of how notation plays a central role in shaping both.

Invited Talk SYHQ 1.3 Mon 10:00 ZHG010
The Nobel committee's position on quantum mechanics: Nominations, evaluations and decisions — •Karl Grandin — Royal Swedish Academy of Science, Stockholm, Sweden

The recognition of quantum mechanics within the framework of the Nobel Prize in Physics illustrates not only its groundbreaking impact on theoretical physics but also the evolving criteria for scientific distinction in the early 20th century. Werner Heisenberg was awarded the 1932 Nobel Prize in Physics, received in 1933, for his foundational contributions to quantum mechanics, particularly the formulation of matrix mechanics. That same year, Erwin Schrödinger and Paul Dirac shared the 1933 Nobel Prize in Physics, acknowledging their work on wave mechanics and the relativistic quantum theory of the electron, respectively.

Nominations for Heisenberg and Schrödinger began as early as 1928, gaining momentum in subsequent years, reflecting the scientific community*s growing appreciation of their contributions. By contrast, Dirac*s nominations were initially fewer, highlighting differing trajectories in the recognition of theoretical achievements. In 1933, all three physicists received special evaluations from the Nobel Committee, with the first such evaluations for Heisenberg and Schrödinger emerging only in 1931.

SYHQ 2: History of Quantum Mechanics II: Foundation, Dissemination, Politicization

Time: Monday 14:00–15:30 Location: ZHG010

Invited Talk SYHQ 2.1 Mon 14:00 ZHG010
Model and Target: Von Neumann's Mathematische Grundlagen — •Michael Stöltzner — University of South Carolina, Columbia, SC, USA

Based on joint work with Hilbert and Nordheim in 1927 and amended with a detailed discussion of measurement, von Neumann's 1932 'Mathematische Grundlagen der Quantenmechanik' was generally considered as the definitive formulation of the theory in rigorous mathematical terms. Especially the no-hidden-variable theorem was often read as a philosophically motivated finality claim. Accordingly, it became attacked by proponents of alternative interpretations, in the case of John Bell even together with mathematical physics as such. But this misunderstands the place that the book had in von Neumann's own work – he quickly moved on from Hilbert spaces to operator algebras – and in his increasingly opportunist understanding of mathematics. Understanding the context of von Neumann's book, including why he stressed the uniqueness and non-extendibility of quantum mechanics, helps to understand the multiple roles his work would play shortly after his death when a renaissance of mathematical physics took place in quantum field theory, and eventually also in atomic physics.

Invited Talk SYHQ 2.2 Mon 14:30 ZHG010
Tracing the dissemination of quantum mechanics: A comparative approach — •Roberto Lalli — Politecnico di Torino, Turin, Italy

The dissemination of quantum mechanics presents significant methodological challenges to historians of science. Exploring how quantum knowledge circulated after 1925, scholars have often adopted case study approaches tailored to specific artifacts, sociocultural settings, or conceptual debates, such as foundational controversies.These diverse perspectives reflect the complexity of tracing knowledge transfer, as the choice of sources*textbooks, conference proceedings, papers, letters, or other materials*critically shapes the narratives constructed. In this talk, I review the methodologies used to study the dissemination of quantum physics and then adopt a comparative approach, focusing on the roles of industrial laboratories, international institutions (such as IUPAP), as well as a network analysis of scientific publications. By analyzing these distinct yet interconnected contexts, I aim to identify patterns and dependencies in the circulation of quantum knowledge, shedding light on the broader historiographical implications of studying its diffusion across scientific, industrial, and institutional landscapes.

Invited Talk SYHQ 2.3 Mon 15:00 ZHG010
Quantum Mechanics and 'Aryan Physics' — •Mark Walker — Dept. of History, Union College, Schenectady, NY USA

This talk will examine the political and ideological attacks made by the Nobel laureate Johannes Stark against quantum mechanics and the scientists associated with it, both during the Weimar Republic and the Third Reich. I will also discuss how established scientists like Werner Heisenberg fought back.

SYHQ 3: Women in the History of Quantum Mechanics: The Project and its New Insights

Time: Monday 16:00–18:00 Location: Forum Wissen

Invited Talk SYHQ 3.1 Mon 16:00 Forum Wissen
Women in the History of Quantum Physics — •Margriet van der Heijden — Eindhoven University of Technology (TU/e), The Netherlands

The narratives of the development of quantum mechanics are as "male-dominated" as this subfield of science itself, science historian Massimiliano Badino noted some nine years ago. The book Women in the History of Quantum Physics: Beyond Knabenphysik aims to challenge these conventional "all-male" narratives. In sixteen chapters, the authors – all members of the international and interdisciplinary working group Women in the History of Quantum Physics – analyse the work and lives of women who contributed to quantum developments in the twentieth century. Not the handful of famous women like Marie Skłodowska Curie, Maria Goeppert Mayer and Lise Meitner, but the women who remained in the shadows, had to interrupt their careers or whose work was overlooked. By analysing and comparing their lives

and work, themes can be distilled that are relevant to understanding why women's participation in physics research remains low even today. I will explore some of these themes and illustrate them with the lives and experiences of some of the protagonists of the book chapters.

Invited Talk SYHQ 3.2 Mon 16:30 Forum Wissen
Molecular WiHQP Vignettes: Hertha Sponer and Elizabeth Monroe — •Patrick Charbonneau — Duke University, Durham, NC, USA

Hertha Sponer spent her early years in Göttingen, at the center of the quantum revolution. Training as an experimentalist under Peter Debye and then heading James Franck's spectroscopy labs as his assistentin uniquely positioned her to contribute to the development of quantum theory and to the emergence of molecular physics. She did so by providing novel interpretations of hitherto unexplained spectrographic data, and by suggesting new applications of the theory to diatomics. Her name has nevertheless been largely written out of scientific accounts of these years. Extant descriptions almost exclusively concern her postwar years at Duke. By that time quantum theory was well established, and her research had pivoted in other directions.

Elizabeth Monroe did not spend time in Göttingen, but trained with two scientists who did: Emmy Noether at Bryn Mawr and John E. Lennard-Jones at Cambridge. Her PhD work on computational methods for solving the electronic structure of simple diatomics followed from that influence. World War II, however, took her away from quantum mechanics. She joined John G. Kirkwood at Cornell to study hard sphere crystallization and later worked on the Manhattan project to develop implosion technology. Following the birth of her son, who suffered from a severe developmental disability, she took up public advocacy, building on her training to move research and policy forward. Others took up computational quantum chemistry.

Invited Talk SYHQ 3.3 Mon 17:00 Forum Wissen
Grete Hermann: A pioneer of the philosophical debate about the foundations of quantum mechanics and a political activist — •Andrea Reichenberger — TU Munich

Grete Hermann, the first doctoral student of mathematician Emmy Noether and private assistant of philosopher Leonard Nelson, was one of the early contributors to the foundations of quantum mechanics. She was also one of Göttingen's most important philosophers. With the advent of National Socialism, Hermann, like many of her colleagues, left Göttingen. While other émigrés had a lasting impact on physics and mathematics abroad, after the war, Hermann instead chose to return to her home country in 1946. As a political activist in the anti-fascist resistance and in post-war education and politics, she played a key role in the social democratic development of the Federal Republic of Germany. A common thread through her work are the Kantian questions: What can I know? And what should I do? My talk explores Hermann's answers to both of these.

30 min. discussion

SYHQ 4: EPS historic site event

Time: Tuesday 18:00–21:30 Location: Aula am Wilhelmsplatz with broadcast to ZHG010 and ZHG011

About 105 min. lecture programme followed by a reception at the Alte Mensa.