

Preface

Quantum mechanics, formulated by Werner Heisenberg in 1925, is among the greatest achievements in physics and it marked the beginning of a completely new area of atomic and fundamental physics. Werner Heisenberg's formulation was the culmination of a series of developments started by Max Planck's postulate of the quantum principle.

The impact quantum mechanics has had on the development of physics can hardly be overestimated. Quantum mechanics was born out of the struggle to explain the complexities of atomic spectra but has since been the key for understanding the properties of matter ranging from its most elementary constituents to its collective behaviour in condensed matter, up to macroscopic scales. In the decades since its first formulation, quantum mechanics has proven to constitute the correct description of nature – no exception to its predictions have been found. Today physical theories describing the beginning of the universe and evolution until its ultimate fate are built on it.

The new way of thinking implied by quantum mechanics also had an important influence beyond physics per se. From his early discussions with Niels Bohr, a pioneer in the development of the atomic model, and throughout his life, Heisenberg was interested in the relation of physics to philosophy and humanities.

The celebration of the 100th anniversary of the birthday of Werner Heisenberg took place in the Great Aula of the Ludwig Maximilians University in Munich on 5th December 2001, the day of Werner Heisenberg's 100th birthday. Heisenberg had studied at the Ludwig Maximilians University in the years 1920 to 1923 under the guidance of the great teacher Arnold Sommerfeld and received his Doctorate in 1923. In 1958 Heisenberg returned to Munich to lead his Max Planck Institute. He worked there until his death in 1976 and was buried in Munich.

The Centennial celebration was opened by the Rector Magnificus of the University, Professor Andreas Helfrich, and the Bürgermeister of the City of Munich, Dr. Waltraud Burkert, followed by addresses from the President of the Max Planck Society, Professor Hubert Markl, and the President of the Bavarian Academy of Sciences at Munich, Professor Heinrich Nöth. The official speeches were delivered by Professor Reimar Lüst, a member of Heisenberg's institute in Göttingen and his successor as President of the Alexander von Humboldt Stiftung, and Professor Chen Ning Yang, Nobel Laureate of 1957 in Physics. While Professor Lüst was honoring Werner Heisenberg in

particular for his role as an organizer of the reconstruction of science in Germany after 1945, Professor Yang pointed out Werner Heisenberg's scientific genius. These two speeches as well as an address of homage by the Japan Academy, delivered by a delegation, are reproduced in the first part of this Festschrift.

The Werner Heisenberg Centennial was accompanied by an International Symposium "Developments in Modern Physics" on the 6th and 7th of December, which was also held in the Great Aula of the Ludwig Maximilians University. The organizers of the Symposium felt that it would best serve the memory of Werner Heisenberg to have an account of central areas of research in fundamental physics – experimental as well as theoretical – presented by eminent speakers. The talks of the Symposium – with the exception of the talk by Michael Turner on "Cosmological Uncertainty" for which no manuscript was submitted – are reproduced in the second part of this Festschrift.

These two central events of the Centennial celebration were accompanied by the exhibition "Werner Heisenberg (1901–1976) – Forscher, Lehrer und Organisator," prepared by Helmut Rechenberg (München) and Gerald Wiemers (Leipzig) in the Max Planck Haus of the Max Planck Society in Munich. A dedicated performance of the theater play "Copenhagen" by Michael Frayn was given at the Deutsches Museum in München; it was performed by the group "Theater Landgraf," Titisee. Commemoration meetings were held in Munich by the Bavarian Academy of Arts of which Heisenberg had been a member, and at the Deutsches Museum of which Heisenberg had been a member of the Vorstandsrat.

The 100th birthday of Werner Heisenberg was celebrated also by institutions and in locations which had been of importance in Heisenberg's scientific life. Out of them are mentioned the dedicated Meeting at Bamberg of the Alexander-von-Humboldt Foundation, of which Werner Heisenberg had been President in the years 1953 to 1975, and a Festcolloquium at the University of Leipzig, where Heisenberg had held his first professorship from 1927 to 1942. The latter was accompanied by a parallel exhibition to the one mentioned.

The Centennial celebrations for Werner Heisenberg were attended by relatives, personal friends, scholars, former colleagues and scientists from all over the world, who wanted to honor this great physicist. To all of them, but in particular to the speakers at the official events, the organizers of the Centennial Celebrations and the editors of the Festschrift want to express their sincerest thanks. They owe their thanks to Helmut Rechenberg for his support and engagement. They are indebted to Rosita Jurgeleit, Kristiane Preuss and Carola Reinke for their engaged participation in the preparation and organization of the different events of the Werner Heisenberg celebration.

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