

Nuncius Hamburgensis –
Beiträge zur Geschichte der Naturwissenschaften, Band 19

Andre Koch Torres Assis,
Karl Heinrich Wiederkehr
and Gudrun Wolfschmidt

Weber's Planetary Model of the Atom



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Figure 0.1:
Wilhelm Eduard Weber (1804–1891)
Foto: Gudrun Wolfschmidt in der Sternwarte in Göttingen

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*Abbildung auf dem Cover vorne und Titelblatt: Wilhelm Weber
(Kohlrausch, F. (Oswalds Klassiker Nr. 142) 1904, Frontispiz)*

*Frontispiz: Wilhelm Weber (1804–1891)
(Feyerabend 1933, nach S. 38, Abb. 17)*

*Abbildung auf dem Cover hinten:
Göttingen, Blick vom Wall auf die Sternwarte, um 1835,
Lithographie von Friedrich Besemann (1796–1854) – (Wiki)*

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Preface:

Weber's Planetary Model of the Atom

It is well known that Wilhelm Eduard Weber (1804–1891) was hired as professor in Göttingen with the recommendation of Carl Friedrich Gauß (1777–1855). The result of their cooperation was the first electromagnetic telegraph in 1833 and the foundation of a geomagnetic observatory in Göttingen. The “Magnetic Association” (*Magnetischer Verein*) became very influential on an international level with about 50 observatories in all five continents. An important result of their cooperation was the publication of the *Atlas des Erdmagnetismus* by Gauß and Weber in 1840. About this topic an exhibition was organized by Gudrun Wolfschmidt and Karl Heinrich Wiederkehr in the State and University Library Hamburg in 2005 and a book was published.¹

Wilhelm Weber started with research in the whole field of magnetism and electrodynamics. Weber's capacity in making precision experiments is famous leading to the absolute system of units, the fundament of our SI-units. The results were published in 1864 as *Electrodynamic Proportional Measures*.

PD Dr. Karl Heinrich Wiederkehr is a pioneer in the field of research concerning Wilhelm Weber and the development of electrodynamics. His dissertation “*Wilhelm Webers Stellung in der Entwicklung der Elektrizitätslehre*” (1960) and the biography of *Wilhelm Eduard Weber – Erforscher der Wellenbewegung und der Elektrizität 1804–1891* (Vol. 32 of the *Reihe Große Naturforscher*), published in 1967, were well acknowledged in the scientific community (cf. the review in *Isis* and in other scientific journals).

During his time as a teacher at a secondary school *Gymnasium* (most recently as *Studiendirektor* and *Koordinator der Oberstufe*) Karl Heinrich Wiederkehr worked as a freelancer after the founding of the *Institute for History of Science and Technology* (1960) without taking a reduction in teaching time. Together with Bernhard Sticker, director of the Institute, he held several talks, especially at the Institute of Teacher Education (*Landesinstitut für Lehrerbildung*

¹ Wolfschmidt, Gudrun (Hg.): *Vom Magnetismus zur Elektrodynamik*. Herausgegeben anlässlich des 200. Geburtstages von Wilhelm Weber (1804–1891) und des 150. Todestages von Carl Friedrich Gauß (1777–1855). Katalog zur Ausstellung in der Staatsbibliothek Hamburg, 3. März bis 2. April 2005. Hamburg: Institut für Geschichte der Naturwissenschaften 2005.



Figure 0.2:

Gauss-Weber-Exhibition *Vom Magnetismus zur Elektrodynamik*
 of the Institute for History of Science and Technology, Hamburg University,
 organized by Gudrun Wolfschmidt and Karl Heinrich Wiederkehr,
 in the State and University Library Hamburg in 2005

Photo: Gudrun Wolfschmidt

und Schulentwicklung) in Hamburg. For the North German radio broadcasting *Norddeutscher Rundfunk* (NDR 3), he wrote text books for the series *Classical Experiments of Physics* (1969) and he organized and designed experiments. In the encyclopaedia *Große Naturwissenschaftler* (1970), ed. by Fritz Krafft and Adolf Meyer Abich, he wrote more than 80 short biographies.

In 1974 Karl Heinrich Wiederkehr finished his habilitation with the title: *René-Just Haüy's Vorstellungen vom Kristallbau und einer chemischen Atomistik*. It was published in four parts in *Centaurus* in 1977 and 1978. This work was reviewed and quoted in the scientific literature (eg. J. J. Burckhardt: *Die Symmetrie der Kristalle* (Birkhäuser 1988)). The book *Physics and Geophysics with Historical Case Studies* (1997), ed. Wilfried Schroeder, presented to his 75th birthday, contains a list of his numerous scientific papers in various fields of physics and geophysics (you find also in this book a list of Wiederkehr's publications, p. 165).

After his retirement, Dr. Wiederkehr worked again at a larger extent in the Institute as *Privatdozent*. In cooperation with Gudrun Wolfschmidt he produced some exhibitions *From Magnetism to Electrodynamics* (2005), *Von Hertz*

zum Handy (the development of communication)² (2007–2008) and *History of Navigation* (2008–2010) and contributed considerably to the publications connected to the exhibitions.³

Together with Andre Koch Torres Assis from Brazil, another important scholar in the field of Wilhelm Weber (cf. a list of his publications can be found also in this book, p. 151), Dr. Wiederkehr cooperated in the years 2001, 2002 and 2009, during his stay in our Institute in Hamburg. We are glad that this further cooperation with Assis was possible, payed by the Humboldt foundation. In this book *Weber's Planetary Model of the Atom* is discussed by Assis in detail.

The next article in this book by Wiederkehr and Wolfschmidt discuss the further development in the 20th century, especially the metal electron theory. Around 1920 atomic physics was developed quickly on the basis of Sommerfeld's influential book *Atombau und Spektrallinien* (Braunschweig 1919). The centers of development were Munich, Göttingen, Zürich and Leipzig. In the middle of the 1920s the theory of quantum mechanics was created (Heisenberg / Born / Jordan, Schrödinger and Dirac). At the end of the 1920s very quickly a number of applications followed with Pauli and Sommerfeld as the leading persons.⁴ Here the school of Sommerfeld contributed considerably.⁵ In 1926 quantum statistics was introduced; the results were compiled by Bethe in his famous article *Elektronentheorie der Metalle* (1933). The further development of the metal electron theory and the beginning of solid state physics is discussed by Eckart/Schubert (1986/1990) and by Hoddeson et al.: *Out of the Crystal Maze* (New York 1990).

Gudrun Wolfschmidt

2 Wolfschmidt, Gudrun (Hg.): Von Hertz zum Handy – Entwicklung der Kommunikation. Norderstedt: Books on Demand (Nuncius Hamburgensis; Band 6) 2007. Wolfschmidt, Gudrun (ed.): Heinrich Hertz (1857–1894) and the Development of Communication. Proceedings of the International Symposium in Hamburg, October 8-12, 2007. Norderstedt: Books on Demand (Nuncius Hamburgensis; Bd. 10) 2008.

3 Wolfschmidt, Gudrun (Hg.): „Navigare necesse est” – Geschichte der Navigation. Norderstedt: Books on Demand (Nuncius Hamburgensis; Band 14) 2008. Wolfschmidt, Gudrun: „Sterne weisen den Weg” – Geschichte der Navigation. Norderstedt: Books on Demand (Nuncius Hamburgensis; Band 15) 2009.

4 Casimir, Hendrik B. G.: Pauli and the Theory of Solid State. In: Theoretical Physics in the Twentieth Century. New York 1960.

5 Eckert, Michael: Die Atomphysiker. Eine Geschichte der theoretischen Physik am Beispiel der Sommerfeldschule. Braunschweig: Vieweg 1993.