HEINRICH HERTZ: A SHORT LIFE

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Heinrich Rudolf Hertz, 1857–1894

Bust by the Bonn sculptor A. Küppers, commissioned in 1894 by Hertz's parents; now in the Burndy Museum, Norwalk, Conn.

Heinrich Hertz, the centenary of whose major contributions to electromagnetic theory we are celebrating this year, was born in Hamburg in 1857. He showed himself to be precociously gifted in all endeavors he undertook, including mechanical skills, and upon completing his secondary education entered on a year's pupilage as a structural engineer in Frankfurt. During the year he became interested in telegraphy and enrolled at the Technical University of Dresden, where the first lectures on the subject were being given. He did not find the course sufficiently challenging and after a semester stopped out to serve his year of compulsory military service. That over, he transferred to the Technical University of Munich, but before the first semester was under way, he switched to physics and the University of Munich, only to transfer once again at the end of the year, to the University of Berlin.

In Berlin he came to the attention of Hermann Helmholtz, whose research student he became while still an undergraduate. Hertz did so well that he was allowed to graduate after three semesters in Berlin (that is, a total of six, instead of the prescribed eight), and then became Helmholtz's postgraduate assistant. He stayed for three years, helping with teaching and working on a variety of topics. One was elasticity, a subject to which he made a lasting contribution by developing the theoretical basis for the measurement of hardness; this work underlies the theory of contact stress analysis to the present day. Then he went as *Privatdozent* (instructor) to the University of Kiel, where he remained for two years.

In 1885, at the age of 28, he was called as "ordinary" (i.e., full) professor to the Technical University of Karlsruhe, the capital of the Grand Duchy of Baden. The institution, the oldest (and one of the best equipped) engineering colleges in the German lands, was not a full-fledged university and could not then award doctorates. Yet Hertz was very happy there. He married the daughter of a colleague and entered on the series of experiments and theoretical analyses for which he is best known: the confirmation that Maxwell's theory of electromagnetic-wave propagation—and not some competing "action-at-a-distance" theory—best accounted for the observed phenomena. That work was largely completed during 1888, a century ago.

These researches made Hertz world famous and brought him offers from many universities, including Berlin, which he declined on the grounds that he was not ready to assume such an important post. (He also feared that the opening, meant for a mathematical physicist, might make it difficult for him to continue to experiment as much as he would like.) He chose the University of Bonn instead. A high point of this period was an invitation to come to London to accept the Royal Society's Rumford Medal, which enabled him to meet many of the British physicists with whom he had been corresponding. (The correspondence has been recently edited and published by J. G. O'Hara and W. Pricha, *Hertz and the Maxwellians: The Discovery of Electromagnetic-wave Radiation 1878-1894*, London: Peter Peregrinus, 1987.)

Hertz's years in Bonn were marred by illness; toward the end, he found it difficult to lecture and occupied himself with a theoretical project, a new theory of mechanics that eliminated force as a fundamental concept. This approach was not widely accepted, although the book in which it was set forth, *The Principles of Mechanics, Presented in a New Form* (1894), is often cited in works on the philosophy of science. The only experimental work done in Bonn was carried out largely by his assistant Philipp Lenard (1862-1947), and resulted in the passage of cathode rays out of the vacuum envelope through a thin aluminum foil (a "Lenard window"). This work, for which Lenard later received the Nobel Prize, played a part in the identification of cathode rays as a stream of electrons.

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Hertz died in Bonn on 1 January 1894, just before his 37th birthday. Mathilde Hertz, the younger of his two daughters, later moved to England with her sister and their mother; just before her death in 1975 she collaborated with the present author in a revised bilingual edition of her father's letters and diaries, *Heinrich Hertz: Memoirs, Letters, Diaries,* San Francisco: San Francisco Press, 1977. Philipp Lenard, who might have written a full-scale biography of his mentor, never did so, perhaps for political reasons. (Hertz was half-Jewish by ancestry; Lenard became an active supporter of the Nazi party.) A book-length Life of Hertz thus still remains to be written, a task the present author is currently undertaking.