

HENDRIK ANTOON LORENTZ  
1853-1928

Lorentz was born in Arnhem on 18 July 1853, the son of Gerrit Frederik Lorentz, owner of a nursery, and Geertruida van Ginkel. He attended the HBS in Arnhem from 1866 to 1869 and enrolled in the University of Leiden in 1870, but after passing his *candidaats* examination in mathematics and physics, in 1871, he returned home in 1872 and did his further studies at Leiden while teaching in Arnhem. He passed his doctoral examinations in 1873 and took his doctorate in 1875 on a dissertation entitled *Over de theorie der terugkaatsing en breking van licht* (On the Theory of the Reflection and Refraction of Light). In 1877 he chose the new chair of theoretical physics at Leiden over the chair of physics and of mathematics at Utrecht and remained at Leiden until 1912. In 1881 he married Aletta Kaiser; the couple had two daughters and two sons (one of whom died in infancy).

During the first two decades of his career at Leiden, Lorentz studied all aspects of physics, but his most important work was on electromagnetic theory. Lorentz was an early champion of Maxwell's equations, demonstrating their superiority over other electromagnetic theories in explaining reflection and refraction at the surface of transparent surfaces, and he solved some problems (e.g., emission spectra) that Maxwell had left unsolved. During this period, Lorentz published about an article per year and had little or no contact with physicists in other countries. He taught conscientiously and wrote two textbooks, *Leerboek der differentiaal- en integraalrekening en van de eerste beginselen der analytische meetkunde* (Textbook on Differential and Integral Calculus and the Elements of Analytic Geometry; 1882), and *Beginnelsen der Natuurkunde* (Elements of Physics; 1888-1890).

But in 1892, Lorentz began articulating his 'electron theory' of electromagnetism, his publication rate increased fourfold, and his contact with physicists in other countries increased commensurably. His book, *Versuch einer Theorie der elektrischen und optischen Erscheinungen in bewegten Körpern* (1895) made him a central figure in electromagnetic theory. When Pieter Zeeman found that spectral lines broadened in a strong magnetic field, Lorentz could explain this phenomenon with his electron theory and predict further phenomena that Zeeman was able to verify in the laboratory. For this work, Zeeman and Lorentz received the Nobel Prize in physics in 1902. In 1904 Lorentz pub-

lished his contraction hypothesis, the 'Lorentz Contractions', a result that Einstein used as an axiom in his 1905 paper on special relativity.

Lorentz was now one of the leading physicists in Europe. Beginning in 1897 he attended scientific meetings in other countries. Because of his stature as a physicist and his language and political skills, Lorentz became a fixture in the international world of science. He chaired the first five Solvay Congresses and as a representative of the Royal Academy of Arts and Sciences after World War I he worked hard to convince his colleagues in France and Belgium to admit German and Austrian scientists to the international community again.

In 1905, Lorentz received an offer from the university of Munich, and in order to make his life at Leiden more attractive the university hired J.P. Kuenen to take the load of teaching the introductory physics courses off Lorentz's shoulders. In 1912, Lorentz was appointed curator of the physics cabinet of Teyler's Museum and secretary of the *Hollandsche Maatschappij der Wetenschappen* in Haarlem, and he now became professor *extraordinarius* at Leiden. In Haarlem he gave popular lectures on science, emulating the Royal Institution of London, and at Leiden he gave a seminar for advanced physics students and colleagues every Monday morning in which he discussed new findings in physics. In addition, from 1918 to 1926 Lorentz chaired a committee to advise the government on the closing off of the *Zuiderzee* and wrote most of the report. He was a member of a number of influential national committees concerned with education and scientific research: the *Wetenschappelijke Adviescommissie ten behoeve van volkswelvaart en weerbaarheid* which later evolved into the *Nederlandsche Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek* (Dutch Organization for Applied Scientific Research), or TNO, and the *Onderwijsraad* (Council for Education), of the department of higher education of which he served as chairman from 1921 to 1926. In these capacities Lorentz was instrumental in a number of changes in Dutch public education at all levels.

#### *Primary works*

*Poggendorff*, vol. 3, 831-832; vol. 4, 911-912; vol. 5, 762-763; vol. 6, 1561-1562. A list of Lorentz's publications can also be found in



*Collected Papers* (see below), vol. 9, 411-434. *Leerboek der differentiaal- en integraalrekening en van der eerste beginselen der analytische meetkunde* (Leiden, 1882, German editions); *Beginnelsen der Natuurkunde* (Leiden, 1888-1890, editions in German, Russian, and Japanese); *Versuch einer Theorie der electrischen und optischen Erscheinungen in bewegten Körpern* (Leiden: Brill, 1895); *Abhandlungen über theoretische Physik* (Leipzig; Berlin: B.G. Teubner, 1907); *The theory of electrons and its applications to the phenomena of light and radiant heat* (Leipzig: Teubner; New York: Stechert, 1909); *Lessen over theoretische natuurkunde, aan de Rijks-Universiteit te Leiden gegeven* (Leiden: Brill, 1919-25; German edition, 1927-1931; English edition, 1931). Most of Lorentz's scientific papers can be found in P. Zeeman and A.D. Fokker, eds, *H.A. Lorentz, Collected Papers*, 9 vols ('s-Gravenhage: Nijhoff, 1935-1939), which contains a complete list of Lorentz's publications (vol. 9, 411-434); see also N.J. Nersessian and H.F. Cohen, eds and trans., *On the theory of the reflection and refraction of light* (Amsterdam: Rodopi, 1997), a translation of Lorentz's dissertation of 1875. Lorentz's unpublished papers and correspondence are in Algemeen Rijksarchief in The Hague; see J.M. Muller, *Inventaris van het archief van H.A. Lorentz (1853-1928): 1866-1930* ('s-Gravenhage: Algemeen Rijksarchief, 1982). See also T.S. Kuhn et al., *Sources for History of Quantum Physics, Memoirs of the American Philosophical Society*, vol. 68 (1967); W. Schroder, 'Hendrik Antoon Lorentz und Emil Wiechert: Briefwechsel und Verhältnis der beiden Physiker', *Archive for History of Exact Sciences* 30 (1984) 167-187; A. Hermann, 'H.A. Lorentz—Praeceptor physicae. Sein Briefwechsel mit dem deutschen Nobelpreisträger Johannes Stark', *Janus* 53 (1966) 99-114; O. Nathan and H. Norden, eds, *Einstein on Peace* (New York: Simon and Schuster, 1960); K. Przibram, ed., and M.J. Klein trans., *Letters on Wave Mechanics: Schrödinger, Planck, Einstein, Lorentz* (New York, 1967).

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[A.v.H.]