Wiener, Ludwig Christian | Encyclopedia.com

(*b*. Darmstadt, Germany, 7 December 1826; *d*. Karlsruhe, Germany, 31 July 1896)

mathematics, physics, philosophy.

In mathematics Christian Wiener did important work in descriptive geometry and the construction of mathematical models. As a physicist he studied chiefly molecular phenomena and atmospheric radiation. In his philosophical writings he advocated a point of view based on the methodology of natural science.

The son of a judge, Wiener attended the gymnasium in Darmstadt and from 1843 to 1847 studied engineering and architecture at the University of Giessen, where he passed the state architecture examination. In 1848 he obtained a post as teacher of physics, mechanics, hydraulics, and descriptive geometry at the Höhere Gewerbeschule (later the Technische Hochschule) of Darmstadt. Two years later he earned the Ph.D. and qualified as a *Privatdozent* in mathematics at the University of Giessen. To further his education he attended the Technical University in Karlsruhe, working for about a year under Ferdinand Redtenbacher, the professor of mechanical engineering. He returned to Giessen in the autumn of 1851; but the folloWing year he accepted a professorship of descriptive geometry at the Technische Hochschule in karlsruhe, retaining the position until 1896.

An able and respected teacher. Wiener trained a great number of students while conducting important research. Elected rector of the Technische Hochschule three times, he was also a member of the Gewerbeschulrat and the Oberschulrat of the state of Baden. Wiener was liked and esteemed for his upright character, his sense of justice, and his kindliness.

In his mathematical works Wiener frequently used direct intuition as an aid in carrying out proofs. This led him into the realm of aesthetics, as can be seen from his philosophical essay “Über die Schönheit der Linien” (1896), which contains an appendix on the relationship between mathematical continuity and the regularity of forms.

Wiener’s chief work was the two-volume *Lehrbuch der darstellenden Geometrie* (1884–1887), based on his teaching experience and numerous publications on descriptive geometry. In the introduction to the*Lehrbuch* he presented a valuable historical survey, based on a firsthand study of the sources, that constituted an important supplement to Chasles’s *Aperçu historique sur l’origine et le développement des méthodes en géométrie* (1837). Wiener treated the basic problems of descriptive geometry by a single method: a varied use of the principal lines of a plane. He also sought to simplify individual problems as much as possible and to find the easiest graphical solutions for them. He was not, however, concerned merely with graphical methods, of which he was a master. He was also interested in the problems and their solutions (such as shadow construction and brightness distribution), as well as in the development of the necessary geometric aids. For example, he used imaginary projection and developed a grid method that can be derived from the theory of cyclically projected point series.

Wiener also became known for his mathematical models. In 1869, at the suggestions of R. F. A. Clebsch, he constructed a plaster-of-Paris model of the third-order surface. He displayed his models at expositions of mathematical teaching aids in London (1876), Munich (1893), and Chicago (1893). In analysis he discussed and drew the Weierstrass function, which is everywhere continuous and yet at no point has a derivative.

Extending his works on descriptive geometry into physics, Wiener investigated the illumination conditions for various bodies. Thus, he calculated the amounts of solar radiation received at different latitudes and during the varying lengths of days in the course of the year. His numerical values are still fundamental for the study of atmospheric optics and of the effect of radiation on the earth’s climate. In a posthumously published article Wiener examined the total radiation received by the atmosphere and considered problems related to color theory and strengths of perceptions.

In his studies on molecular physics, Wiener demonstrated by extremely careful observations that Brownian movement is an “internal motion peculiar to the liquid state,” He developed an atomistic cosmology, which he set forth in *Atomlehre* (1869), the first volume of his chief philosophical work, *Die Grundzüge der Weltordnung*. He presupposed the causality of all natural phenomena and the existence of a real external world but, in accordance with a view widely held at the time, he still accepted the existence of an ether . In his treatment of crystalline forms Wiener developed the concept of the regular point system, which became important in crystallography.

Among the topics Wiener discussed in his writings on moral philosophy were will and morality. He defined free will as independence from external, determining circumstances only, thus precluding full independence–that is, absolute freedom. He opposed the view of some of his contemporaries that scientific research, with its analytic methods, could become a danger to man's sense of morality and beauty Unlike his other publications, Wiener's philosophical works found only a limited audience.

BIBLIOGRAPHY

I. Original Works. Bibliographies of Wiener's approximately 100 scientific books and papers are in Poggendorff, II, 1322, and III, 1442; and in the unsigned *Zur Erinnerung an Dr. Christian Wiener* (see below).

Mathematical works include *Über Vielecke und Vielflache* (Leipzig, 1864); *Stereoskopische Photographie des Modells einer Fläche dritter Ordnung mit* 27 *reellen Geraden* (Leipzig, 1869); "Direkte Lösung der Aufgabe: Einen durch fünf Punkte oder durch fünf Tangenten gegebenen Kegelschnitt auf einen Umdrehungskegel zu legen," in *Zeitschrift füu Mathematik und Physik*, **20** (1875), 317–325; "Geometrische und analytische Untersuchung der Weierstrass'schen Funktion," in *Journal für die reine und angewandte Mathematik*, **90** (1880), 221–252; and *Lehrbuch der darstellenden Geometrie*, 2 vols. (Leipzig, 1884–1887).

Writings in physics are "Erklärung des atomistischen Wesens des tropfbar-flüssigen Körperzustandes und Bestätigung desselben durch die sogenannten Molekularbewegungen," in *Annalen der Physik und Chemie*, **118** (1863), 79–94; "Über die Stärke der Bestrahlung der Erde durch die Sonne in ihren verschiedenen Breiten und Jahreszeiten," in *Zeitschrift für Mathematik und Physik*, **22** (1877), 341–368, also abridged in *Österreichische Zeitschrift für Meteorologie*, **14** (1879), 113–129; and "Die Helligkeit des klaren Himmels und die Beleuchtung durch Sonne, Himmel und Rückstrahlung," H. Wiener, O. Wiener, and W. Möbius, eds., 2 pts., *Nova acta Leopoldina*,**73,** no. **1** (1900), and **91,** no. **2** (1909).

On philosophy, see *Die Grundzüge der Weltordnung* (Leipzig-Heidelberg, 1863), 2nd ed., 2 vols.: 1, *Atomlehre* (1869), II ,*Die geistige Welt und der Ursprung der Dinge* (1869); and "Über die Schönheit der Linien," in *Abhandlungen des Naturwissenschaftlichen Vereins in Karlsruhe*, **11** (1896), 47–73.

II. Secondary Literature. See the unsigned *Zur Erinnerung an Dr. Christian Wiener* (Karlsruhe, 1896); A. Brill and L. Sohnke, "Christian Wiener," in *Jahresberichte der Deutschen Mathematiker-Vereinigung*, **6** (1897), 46–69; and H. Wiener, "Wiener. Christian," in *Allgemeine deutsche Biographie* XLII (1897), 790–792.

Hans-GÜnther KÖrber