

Marcel Grossmann | Encyclopedia.com

Complete Dictionary of Scientific Biography COPYRIGHT 2008 Charles Scribner's Sons
10-12 minutes

(b. Budapest, Hungary, 9 April 1878; d. Zurich, Switzerland, 7 September 1936),

mathematics. For the original article on Grossmann see *DSB*, vol. 5.

Grossmann's main achievements concerned geometry, but he was also deeply engaged in mathematical education, and even interested in politics. He was one of Einstein's most important student friends, contributing to Einstein's understanding of tensor calculus, a necessary requirement for relativity theory.

Life Overview . The Grossmann family was originally from Höngg, Switzerland. [Marcel Grossmann](#) was the son of the merchant Jules Grossmann and Katharina Henri-ette Grossman (nee Lichtenhahn). Marcel was born in Budapest, where his family lived until he was fifteen years old. Then his family moved to Switzerland and Grossmann attended high school in Basel. After his examinations in 1896, he began to study at the Eidgenössische Technische Hochschule (ETH) in Zurich. His main professors in geometry had been Wilhelm Fiedler and Carl Friedrich Geiser; Geiser had organized the first International Mathematical Congress in 1897 in Zurich. Grossmann's fellow students in class of Section VIa (for teachers of mathematic and physics) were Louis Kollros, Jakob Ehrat, Louis-Gustave Du Pasquier, Mileva Maric, and [Albert Einstein](#). Grossmann graduated in 1900, and immediately afterward became assistant to Fiedler. One year later he was professor of mathematics at the cantonal school in Frauenfeld; in 1903 he married Anna Keller.

In 1902 Grossmann earned his doctorate with a thesis "Über die metrischen Eigenschaften Kollinearer Gebilde" (Frauenfeld, 1902), where he presented major constructions within hyperbolic and elliptic geometry; he quoted especially Fiedler, [Jakob Steiner](#), and Heinrich Liebmann; and textbooks of [Felix Klein](#), George Salmon, and Fiedler, and Alfred Clebsch Ferdinand von Lindemann. Grossmann received his degree from the university of Zurich, because the ETH was not yet able to accept mathematical dissertations.

In the following years Grossmann published many articles and textbooks on geometry, some of the latter in several editions. His main fields were analytical, descriptive, projective, and [non-Euclidean geometry](#). Four students wrote doctoral theses under his auspices.

In 1905 Grossman moved to the Oberrealschule in Basel and became privatdocent at the university. In 1907 Grossmann was appointed professor of descriptive geometry at the ETH, a position which he held until 1927. He had to retire prematurely, because he fell ill; he died nine years later in 1936. He was succeeded by his former assistant Walter Saxer.

Grossmann was also interested in organization, and together with others in 1910 he founded the Swiss Mathematical Society. He served as its president during the years 1916 and 1917. In 1911 Grossmann published an important Report concerning lecturing on mathematics; Grossmann was deeply involved with pedagogical problems and published numerous papers to ameliorate instruction. During [World War I](#), Grossmann worked for a better unification of the French and German parts of Switzerland, becoming co-editor of an important newspaper, the *Neue Schweizer Zeitung*.

Grossmann's Relationship with Einstein . Grossmann and Einstein had been fellow students at the ETH. They had attended Geiser's lectures on differential geometry, which played a crucial role in Einstein's later work: "Professor Geiser's lectures on differential geometry, true masterpieces of the pedagogical art, fascinated me and later were very helpful to me in the search for general relativity" (Einstein, 1955). Grossmann's lecture notes are preserved in the

archive of the ETH. Einstein was unable to find an academic position after graduation. He wrote, "The greatest thing that [Marcel Grossmann](#) did for me as a friend was this: About a year after the end of our studies, with his father's help he recommended me to the Director (Friedrich Haller) of the Swiss Patent Office, which was then still called 'The Office for Intellectual Property.' After a thorough oral examination, Herr Haller hired me" (Einstein, 1955). True to his earlier promise, in 1905 Einstein dedicated his dissertation, "Eine neue Bestimmung der Moleküldimensionen," to "my friend Marcel Grossmann."

In 1912, when Einstein moved from Prague back to Zurich, he was already aware of the analogy between the non-flat space-time he was introducing in his new theory of gravitation, and Gauss's surface theory, a full account of which Geiser had presented. The problem was to find a four-dimensional version of [Carl Friedrich Gauss](#)'s theory. "With this problem in mind, I visited my old student friend Marcel Grossmann, who in the meantime had become Professor of Mathematics at the Swiss

Polytechnic. He caught fire immediately, even though as a true mathematician he took a somewhat skeptical attitude to physics. ... [H]e was indeed quite ready to collaborate on the problem with me, but with the limitation that he would take no responsibility for any claims and interpretations of a physical nature. He reviewed the literature and soon discovered that the mathematical problem had already been solved, in particular by Riemann, Ricci and Levi-Civita" (Einstein, 1955). Gregorio Ricci-Curbastro and Tullio Levi-Civita had developed a useful formalism, the absolute differential calculus (tensor calculus), which Einstein and Grossmann adopted. On 9 September 1913 the two presented their first lectures on this subject. These were published in the same year in the *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich*, vol. 58, under the titles: "Physikalische Grundlagen einer Gravitationstheorie" (pp. 284–290) and "Mathematische Begriffsbildungen zur Gravitationstheorie" (pp. 291–297). Shortly afterward, their paper "Entwurf einer verallgemeinerten Relativitätstheorie und einer Theorie der Gravitation" followed, the first mathematical part by Grossmann and the second physical part by Einstein (*Zeitschrift für Mathematik und Physik* 62, 1913–1914, pp. 225–261). In 1915 they published their last joint paper, "Kovarianzeigenschaften der Feldgleichungen" (*Zeitschrift für Mathematik und Physik* 63, 1915, pp. 215–225).

In 1914 Einstein moved to Berlin and continued to work alone on general relativity until its definitive formulation at the end of 1915. Einstein praised Grossmann's contribution with warm words in his main publication on the general relativity theory in 1916: "Grossmann supported me through his help, not only in sparing me the study of the relevant mathematical literature, but also in the search for the gravitational field equations" (Einstein, 1995, vol. 6, p. 284).

Near the end of his life, Einstein paid a final tribute to his long-departed friend:

In these student years I developed a true friendship with a fellow student, Marcel Grossmann. Once a week as a special treat, I went with him to the Cafe Metropol on the Limmatquai; our discussions concerned not only our studies, but ranged far beyond over all the topics that could interest young people who kept their eyes wide open. Not such a vagabond and off-beat character as I, he was anchored in the Swiss milieu without thereby losing any of his inner independence. In addition, he possessed in full measure just those gifts that I lacked: the ability to grasp things quickly and a sense of order in everything. He not only attended all the lectures that we were supposed to, but his notes on them were worked out in such excellent fashion, that his notebooks could very well have been published. In preparation for examinations, he lent these notebooks to me and they served as a [life preserver](#); I would rather not speculate on what would have happened to me without them. (Einstein, 1955)

SUPPLEMENTARY BIBLIOGRAPHY

WORKS BY GROSSMAN

Die fundamentalen Konstruktionen der nichteuklidischen Geometrie. Programm der Thurgauischen Kantonsschule vom Jahre 1903/04.

Analytische Geometrie. Basel: Helbling & Lichtenhahn 1906.

Einführung in die Darstellende Geometrie. Leitfaden für den Unterricht an höheren Lehranstalten. Basel: Helbling & Lichtenhahn, 1906; 2nd ed. 1912; 3rd ed. 1917.

Der mathematische Unterricht an der Eidgenössischen Technischen Hochschule. Basel und Genf: Georg & Co., 1911.

Darstellende Geometrie. Leipzig: B.G. Teubner, 1915; 2nd ed., 1921; 3rd ed., 1932.

Elemente der darstellenden Geometrie. Leipzig: B. G. Teubner, 1917.

Darstellende Geometrie für Maschineningenieure. Berlin: Springer Verlag, 1927.

OTHER SOURCES

Einstein, Albert. "Erinnerungen—Souvenirs." *Schweizerische Hochschulzeitung* 28 (1955): 145–153. Reprinted as "Autobiographische Skizze." In *Helle Zeit—Dunkle Zeit*, edited by Carl Seelig. Zurich: Europa, 1956.

— — — "Einstein on Gravitation and Relativity: The Collaboration with Marcel Grossman." In *The Collected Papers of Albert Einstein*, Vol. 4. Princeton, NJ: [Princeton University](#) Press, 1995.

Kollros, L. "Prof. Dr. Marcel Grossmann." *Verhandlungen der Schweizerischen naturforschenden Gesellschaft* 118 (1937): 325–329.

Reich, Karin. "Einsteins und Großmanns Zusammenarbeit." *Die Entwicklung des Tensorkalküls*. Basel: Birkhäuser, 1994.

Saxer, Walter. "Marcel Grossmann." *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich* 81 (1936): 322–326.

Karin Reich