

天才数学家-希尔伯特

生平

- 希尔伯特 (David Hilbert) 1862年出生于哥尼斯堡 (Königsberg), 现在属于俄国的加里宁格勒 (Kaliningrad)。

Leonhard Euler and the Seven Bridges of Königsberg

COLIN ADAMS

Once upon a time, a small boy was born in the town of Basel, Switzerland. His parents, impressed by the intelligent look in his eyes, named him Leonhard

引自: Adams, C. Leonhard Euler and the Seven Bridges of Königsberg. Math Intelligencer 33, 18-20 (2011).

- 希尔伯特10岁时，进入Friedrichskolleg Gymnasium接受教育，之后转入Wilhelm Gymnasium。毕业后，进入哥尼斯堡大学。在那里与明科夫斯基（Hermann Minkowski）、赫尔维茨（Adolf Hurwitz）成为朋友。



David Hilbert



Herman Minkowski

引自: Rowe, D.E. David Hilbert on Poincaré, Klein, and the World of Mathematics. The Mathematical Intelligencer 8, 75-77 (1986)

- 1885年，希尔伯特在哥尼斯堡大学获得博士学位，研究领域是几何与数论，论文是“On the invariant properties of special binary forms, in particular the spherical harmonic functions”。之后的1886-1895，留校任教。



Fig. 1. Hilbert in the days when he was regarded as merely one of many experts on the theory of invariants.

引自: Rowe, D.E. Hilbert's early career: Encounters with allies and rivals. *The Mathematical Intelligencer* 27, 72-82 (2005).

- 1895年，在克莱因（Felix Klein）的影响下，希尔伯特加盟哥廷根大学（University of Göttingen）并在那里度过剩下的研究岁月，直到1943年去世。



Hilbert's home in Göttingen, 29 Wilhelm-Weber-Straße, from 1897.

引自：Thiele R. (2005) Hilbert and his Twenty-Four Problems. In: Van Brummelen G., Kinyon M. (eds) Mathematics and the Historian's Craft. CMS Books in Mathematics. Springer, New York, NY.

- “We must know. We shall know.”



We must know. We shall know.

引自: Thiele R. (2005) Hilbert and his Twenty-Four Problems. In: Van Brummelen G., Kinyon M. (eds) Mathematics and the Historian's Craft. CMS Books in Mathematics. Springer, New York

交往

- 学生：策梅洛（Ernst Zermelo）、外尔（Hermann Weyl）
- 助手：冯洛依曼（John von Neumann）
- 朋友：艾米·诺特尔（Emmy Noether）、邱奇（Alonzo Church）



Emmy Noether.

引自：Rowe, D.E. On Emmy Noether's Role in the Relativity Revolution. *Math Intelligencer* 41, 65-72 (2019).

贡献

- 23个问题 (The 23 problems)

Mathematische Probleme.

Vortrag, gehalten auf dem internationalen Mathematiker-Kongreß
zu Paris 1900.

Von

D. Hilbert.

Wer von uns würde nicht gern den Schleier lüften, unter dem die Zukunft verborgen liegt, um einen Blick zu werfen auf die bevorstehenden Fortschritte unsrer Wissenschaft und in die Geheimnisse ihrer Entwicklung während der künftigen Jahrhunderte! Welche besonderen Ziele werden es sein, denen die führenden mathematischen Geister der kommenden Geschlechter nachstreben? welche neuen Methoden und neuen Thatsachen werden die neuen Jahrhunderte entdecken — auf dem weiten und reichen Felde mathematischen Denkens?

引自: Thiele R. (2005) Hilbert and his Twenty-Four Problems. In: Van Brummelen G., Kinyon M. (eds) Mathematics and the Historian's Craft. CMS Books in Mathematics. Springer, New York, NY.

- 几何公理化 (Axiomatization of geometry)

a fundamental role that cannot be relinquished. In the introduction to the course, Hilbert formulated it in the following words:

Geometry is the science that deals with the properties of space. It differs essentially from pure mathematical domains such as the theory of numbers, algebra, or the theory of functions. The results of the latter are obtained through pure thinking... The situation is completely different in the case of geometry. I can never penetrate the properties of space by pure reflection, much as I can never recognize the basic laws of mechanics, the law of gravitation or any other physical law in this way. Space is not a product of my reflections. Rather, it is given to me through the senses. I thus need my senses in order to fathom its properties. I need intuition and experiment, just as I need them in order to figure out physical laws, where also matter is added as given through the senses.³

引自: Corry L. (2007) The Origin of Hilbert's Axiomatic Method1. In: Janssen M., Norton J.D., Renn J., Sauer T., Stachel J. (eds) The Genesis of General Relativity. Boston Studies in the Philosophy of Science, vol 250. Springer, Dordrecht.

- 约旦问题 (Gordan's Problem)



Paul Gordan joined Klein on the Erlangen faculty in 1874 and remained there until his death in 1912. His star student was Emmy Noether, daughter of Gordan's colleague, Max Noether.

引自: Rowe, D.E. Hilbert's early career: Encounters with allies and rivals. *The Mathematical Intelligencer* 27, 72-82 (2005).

- 20世纪研究领域最广的数学家

David Hilbert

It will be difficult to find a twentieth century mathematician working in an area that was not touched by David Hilbert. There is Hilbert space, Hilbert scheme, Hilbert polynomial, Hilbert matrix, Hilbert inequality, Hilbert invariant integral, Hilbert norm-residue symbol, Hilbert transform, Hilbert class-field, Hilbert basis theorem, Hilbert irreducibility theorem, Hilbert nullstellensatz.

引自: Bhatia, R. David Hilbert. Reson 4, 3-5 (1999).