

2018 George David Birkhoff Prize in Applied Mathematics

BERND STURMFELS was awarded the 2018 George David Birkhoff Prize in Applied Mathematics at the 124th Annual Meeting of the AMS in San Diego, California, in January 2018.



Bernd Sturmfels

Citation

The 2018 George David Birkhoff Prize in Applied Mathematics is awarded to Bernd Sturmfels for his instrumental role in creating the field of applied algebraic geometry. He has made foundational contributions to combinatorics, algebraic geometry, and symbolic computation, and he has introduced algebraic techniques to numerous areas of applied mathematics, including

bioinformatics, computer vision, optimization, and statistics. Like Birkhoff, the intellectual range of his work stretches from pure mathematics to the very applied and demonstrates the unity of mathematics. In addition, he is an exceptional expositor, a wonderful teacher, and a dedicated mentor to young mathematicians.

Biographical Sketch

Bernd Sturmfels received doctoral degrees in mathematics in 1987 from the University of Washington, Seattle, and the Technical University Darmstadt, Germany. After postdoctoral years in Minneapolis and Linz, Austria, he taught at Cornell University before joining the University of California Berkeley in 1995, where he is professor of mathematics, statistics, and computer science. Since 2017 he has been director at the Max-Planck Institute for Mathematics in the Sciences, Leipzig. His honors include a Sloan Fellowship, a David and Lucile Packard Fellowship, a Clay Senior Scholarship, an Alexander von Humboldt Senior Research Prize, the SIAM von Neumann Lectureship, and the Sarlo Distinguished Mentoring Award. He served as vice president of the American Mathematical Society from 2008 to 2010, and he was awarded an honorary doctorate from Frankfurt University in 2015. A leading experimentalist among mathematicians, Sturmfels has authored ten books and 250 research articles in the areas of combinatorics,

algebraic geometry, symbolic computation, and their applications. He has mentored forty-five doctoral students and numerous postdocs. He is a Fellow of the AMS and of the Society for Industrial and Applied Mathematics (SIAM). His current research addresses questions in algebra that are inspired by statistics, optimization, and biology.

Response from Bernd Sturmfels

I am deeply honored and delighted to receive the 2018 George David Birkhoff Prize in Applied Mathematics. I greatly appreciate the citation and the recognition from the American Mathematical Society and the Society for Industrial and Applied Mathematics. George David Birkhoff is one of my heroes: he embodies the unity of mathematics, scholarship, and mentorship.

The Birkhoff Prize was established exactly fifty years ago, and it is the greatest honor for me to join the distinguished list of scholars who have shaped our science for half a century. This year's award recognizes the emerging field of applied algebraic geometry and the many wonderful colleagues and mentees who have been involved in its development.

A pivotal event was the year-long research program at the Institute for Pure and Applied Mathematics in 2006–2007. The IMA director at the time, Doug Arnold, was an amazing cheerleader. It was his idea to create a SIAM Activity Group in Algebraic Geometry and thus establish a direct link between a “pure” field that is central to mathematics with exciting new directions of application. This development ultimately led to the *SIAM Journal on Applied Algebra and Geometry*, which now offers a home for the directions listed in the citation.

Birkhoff taught us that mathematics can be outward looking and yet remain deep. Connections with the life sciences are especially important. They continue to be a challenge and an opportunity, and I owe a lot to Lior Pachter for guiding me towards this path. While it is most valuable to apply mathematics to biology, I continued to be intrigued by the converse. My hope is to witness the

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discovery of new and innovative ways in which biology can contribute to mathematics.

I am indebted to my mentors, Louis Billera, Jürgen Bockowski, Bruno Buchberger, William Fulton, Israel Gel'fand, and Victor Klee, who taught me the craft of our field and guided me into the academic community. Through them I learned that I might not be an imposter after all.

It is amazing fun to work with others, and I had the great fortune of collaborating with many inspiring colleagues. Most of all, I am grateful to my PhD students and postdocs at Cornell, Berkeley, Berlin, and Leipzig. They have been my ultimate teachers. Finally, I wish to thank my family: my wife, Hyungsook, and my children, Nina and Pascal, for their support of my mathematical journey and for putting up with my crazy early-morning schedule.

About the Prize

The Birkhoff Prize recognizes outstanding contributions to applied mathematics in the highest and broadest sense and is awarded every three years. Established in 1967, the prize was endowed by the family of George David Birkhoff (1884–1944), who served as AMS president during 1925–1926. The prize is given jointly by the AMS and the Society for Industrial and Applied Mathematics (SIAM). The recipient must be a member of one of these societies. The prize carries a cash award of US\$5,000.

The recipient of the Birkhoff Prize is chosen by a joint AMS-SIAM selection committee. For the 2018 prize, the members of the selection committee were:

- Andrea L. Bertozzi
- Kenneth M. Golden
- Michael C. Reed (Chair)

A list of previous recipients of the Birkhoff Prize may be found on the AMS website at: www.ams.org/profession/prizes-awards/pabrowse?url=birkhoff-prize.

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