

Merten M. Hasse Award

The Merten M. Hasse Prize is for a noteworthy expository paper appearing in an Association publication, at least one of whose authors is a younger mathematician. The prize is named after Merten M. Hasse, an inspiring and dedicated teacher of the anonymous donor who gave funds to MAA in 1986 to support the prize honoring such teachers. The Hasse prize is designed to be an encouragement to younger mathematicians to take up the challenge of exposition and communication.

Zvi Rosen, Jessica Sidman, and Louis Theran

“Algebraic Matroids in Action,” *The American Mathematical Monthly*, 127:3, 199–216,
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The 2021 Merten Hasse Award for expository writing goes to “Algebraic Matroids in Action” by Zvi Rosen, Jessica Sidman, and Louis Theran. This compelling and engaging work allows any interested reader to get a taste of matroids, an important topic which deserves to be better understood by the general mathematical public. Using the unifying theme of the connection between algebraic independence and combinatorial independence, complemented by easily understood examples, the authors expertly weave a tale that explores the ways algebraic matroids appear in a wide variety of settings. Along the way, the authors describe bits and pieces of the history of the development of matroids, including work of van der Waerden, Birkhoff, Mac Lane, Whitney, and Rota. In addition to presenting the theoretical foundations of matroids, with connections to well-known concepts such as prime ideals and varieties, the authors showcase the applications of matroids to matrix completion and rigidity theory. In these settings, the fundamental problem is to determine the extent to which certain unknowns depend algebraically on given data. Algebraic matroids provide a particularly efficient, and elegant, answer to these sorts of questions. Throughout, the authors consistently return to their small set of examples to demonstrate key ideas. Anyone wanting to know more about the fundamental idea of algebraic matroids (and matroids in general) along with their connections to other areas of mathematics would be well served by reading “Algebraic Matroids in Action.”

Response

It is a delightful surprise to receive the Merten M. Hasse Prize for our paper “Algebraic matroids in action.” The circle of ideas explored in the paper emerged from interactions between different communities: combinatorics, discrete geometry, algebraic geometry, and statistics. This synthesis guided our presentation, and we hope that our paper will be valuable as a guide. At the same time, all the concepts and tools have a deep historical background, which we quite enjoyed exploring.

We would like to thank Bernd Sturmfels for his encouragement on this project. Zvi and Louis would like to thank Franz Király for many interesting conversations about algebraic matroids and matrix completion.

Biographical Sketches

Zvi Rosen has been an assistant professor in the Department of Mathematical Sciences at Florida Atlantic since 2018. He received a BA and MA in mathematics from the University of Pennsylvania, and a PhD from the University of California, Berkeley. Zvi has been finding matroids in unusual places since graduate school; most recently, he explored oriented matroids arising in neural coding. He is very grateful to both of his co-authors for their mentorship, going as far back as the 2009 Mount Holyoke REU.

Jessica Sidman is the Professor of Mathematics on the John S. Kennedy Foundation at Mount Holyoke College, where she has been since 2004. She received a BA in mathematics from Scripps College and a MS

and PhD from the University of Michigan. She enjoys exploring connections between algebraic geometry, combinatorics, and applications and is currently very excited about using rigidity theory to design tent frameworks.

Louis Theran is a lecturer in mathematics at the University of St Andrews, where he has been since 2016. He received a BS in computer science and mathematics and an MS and PhD in computer science from the University of Massachusetts, Amherst. He works on discrete geometry, especially around geometric and algebraic aspects of rigidity theory, plus occasional forays into related problems in statistics and physics.