

2007 Morgan Prize

The 2007 AMS-MAA-SIAM Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student was awarded at the Joint Mathematics Meetings in New Orleans in January 2007.

The Morgan Prize is awarded annually for outstanding research in mathematics by an undergraduate student (or students having submitted joint work). Students in Canada, Mexico, or the United States or its possessions are eligible for consideration for the prize. Established in 1995, the prize was endowed by Mrs. Frank Morgan of Allentown, Pennsylvania, and carries the name of her late husband. The prize is given jointly by the AMS, the Mathematical Association of America (MAA), and the Society for Industrial and Applied Mathematics (SIAM) and carries a cash award of US\$1,000.

Recipients of the Morgan Prize are chosen by a joint AMS-MAA-SIAM selection committee. For the 2007 prize, the members of the selection committee were: Kelly J. Black, James H. Curry, Herbert A. Medina (chair), Karen E. Smith, Judy L. Walker, and Paul Zorn.

Previous recipients of the Morgan Prize are: Kannan Soundararajan (1995), Manjul Bhargava (1996), Jade Vinson (1997), Daniel Biss (1998), Sean McLaughlin (1999), Jacob Lurie (2000), Ciprian Manolescu (2001), Joshua Greene (2002), Melanie Wood (2003), Reid Barton (2005), and Jacob Fox (2006).

The 2007 Morgan Prize was awarded to DANIEL KANE. The text that follows presents the selection committee's citation, a brief biographical sketch, and the awardee's response upon receiving the prize.

Citation

Daniel Kane is majoring in both mathematics and physics at the Massachusetts Institute of Technology (MIT) and expects to receive his bachelor's degree in June 2007. At this early stage of his mathematical career, Daniel has already established a research record that would be the envy of many professional mathematicians. Indeed, he has authored or co-authored ten articles that have appeared or

will soon appear (have been accepted) in research journals including the *Proceedings of the American Mathematical Society*, *The Ramanujan Journal*, *The Journal of Number Theory*, *Foundations of Computer Science*, and *Integers: Electronic Journal of Combinatorial Number Theory*. In addition, he has six other research papers that have been submitted or are in preparation for a total of sixteen research papers! The specifics of his research are too long to detail, but we mention that it has been in fields as diverse as number theory, computer science, ergodic theory, combinatorics, computational geometry, and game theory.

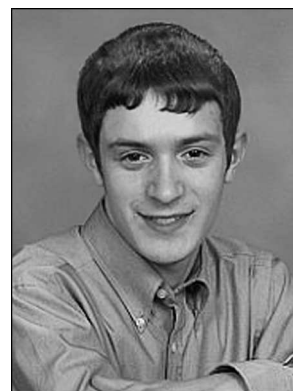
Mr. Kane's mathematical talent is captured well in some of the comments/summaries contained in the letters supporting his nomination for the prize:

- "Daniel's first paper improves on a famous *Annals of Mathematics* paper by Paul Erdős."
- "He proved an open conjecture stated by a well-known number theorist several years before. It [Kane's paper] was written while Daniel was in 12th grade."
- "He is by far the sharpest and most productive math undergraduate I have come in contact with in my five years [at MIT]."

In addition to all of his mathematical research, Daniel is also a three-time Putnam Fellow and two-time International Mathematical Olympiad (IMO) Gold Medalist.

Biographical Sketch

Daniel Kane was born in Madison, Wisconsin, to professors of mathematics and of biochemistry. His schooling began at Wingra, a private school unusual in its noncompetitive policies and open classrooms. When it became clear (in about the third grade) that he was ready for high school math, he was allowed to do more advanced math assigned by his parents. Due to this head start, he was ready



Daniel Kane

to begin taking university classes at the beginning of high school. After graduating, Kane went to MIT to study mathematics and physics.

Kane first learned about mathematical problem solving through the University of Wisconsin's Van Vleck Talent search. This training helped immensely when he took the USA Mathematical Olympiad in the 7th grade, qualifying for the Mathematical Olympiad Program (MOP), which he continued to attend for the duration of high school, earning two IMO gold medals.

Kane became interested in research near the end of high school, when he did work on modular forms under the supervision of Ken Ono. In college his opportunities for research expanded greatly, including the summer programs at Williams College and University of Minnesota-Duluth, class projects, and competitions.

Response

In receiving this award I would like to extend my thanks to all of those who helped make it possible. Most importantly, I would like to thank my parents for giving me such a good environment to grow up in and in particular my dad for teaching me and helping me to develop my love of mathematics. Thanks are also due to those who helped me get started learning mathematical problem solving skills such as Marty Isaacs, who ran the Van Vleck Talent Search, and Titu Andreescu and the other MOP instructors. I would like to thank those who helped supervise parts of my research, namely, Ken Ono, Joe Gallian, Cesar Silva, and Erik Demaine. Lastly, I would like to thank my many teachers over the years who have provided me with the knowledge base to be able to conduct interesting research in so many areas.