# AKSHAY VENKATESH TO RECEIVE 2008 SASTRA RAMANUJAN PRIZE

The 2008 SASTRA Ramanujan Prize will be awarded to Akshay Venkatesh, who is now Professor of Mathematics at Stanford University, USA. This annual prize, which was established in 2005, is for outstanding contributions to areas of mathematics influenced by the genius Srinivasa Ramanujan. The age limit for the prize has been set at 32 because Ramanujan achieved so much in his brief life of 32 years. The $10,000 prize will be awarded at the International Conference on Number Theory and Modular Forms, Dec 20-22, 2008 at SASTRA University in Kumbakonam, India, Ramanujan's hometown.

Professor Venkatesh has made far reaching contributions to a wide variety of areas in mathematics including number theory, automorphic forms, representation theory, locally symmetric spaces and ergodic theory, by himself and in collaboration with several mathematicians. We highlight a few of his path-breaking works: His paper with H. Helfgott (Journal of the American Mathematical Society 2006), containing a number of very striking and original ideas, gives the first non-trivial upper bound for the 3-torsion in class groups of quadratic fields. His work with Jordan Ellenberg (Inventiones Mathematicae 2007) on representing integral quadratic forms by quadratic forms is spectacular and has its roots in the work of Ramanujan. In collaboration with Ellenberg, Venkatesh has provided a striking application of Ratner's classification of measures invariant under unipotent flows to a central problem on quadratic forms studied by Siegel, the scalar case of which was of interest to Ramanujan. The problem is that of representing integral quadratic forms in $m$ variables by one in $n$ variables; Ellenberg and Venkatesh obtain a local to global principle that provides much sharper results than what was known previously by analytic methods.

An important and difficult topic in number theory is the problem of asymptotically counting number fields of a given degree according to their discriminants. This is a generalization of the classical problem of determining the relation between the number of rational or integral solutions of a polynomial equation in several variables and the coordinates of the solutions - in modern language, the problem of counting integral or rational points on an algebraic variety in terms of the height. In the case of degree up to 5, the problem was solved by Manjul Bhargava (who won the 2005 SASTRA Prize among other awards). In another paper, Ellenberg and Venkatesh (Annals of Mathematics 2006) consider bounding the number of number fields of a given degree with bounded discriminants, and provide the first major improvements (when the degree is large) over earlier bounds of Wolfgang Schmidt, thereby breaking an impasse of several years. Also of great importance is Venkatesh's paper with E. Lindenstrauss (GAFA 2007) in which the conjecture of Peter Sarnak that Weyl's law holds for the cuspidal spectrum of a congruence quotient of a locally symmetric space, is proved. In addition, with Lior Silberman, Venkatesh established partial results towards the "quantum unique ergodicity" conjecture of Rudnick and Sarnak for higher rank arithmetic locally symmetric spaces. One of his most spectacular achievements is his own individual work on subconvexity of automorphic L-functions. The problem of sub-convex bounds at the center of the critical strip for L-functions is very important. Venkatesh provides a very novel and more direct way of establishing sub-convexity in numerous cases thereby going beyond the foundational work of Hardy-Littlewood-Weyl, Burgess, and Duke-Friendlander-Iwaniec that dealt with important special cases. This work of Venkatesh is destined to be a classic in the analytic theory of automorphic forms. Finally, Venkatesh's recent work with Manfred Einseidler, Elon Lindenstrauss and Philippe Michel on Duke's theorem for cubic fields is very striking.

Venkatesh, who is of South Indian descent (a Tamilian like Ramanujan), was born in New Delhi in 1981 but was raised in Perth, Australia. He showed his brilliance in mathematics very early and was awarded the Woods Memorial Prize in 1997 at the University of Western Australia when he finished his undergraduate degree.

Venkatesh's entry into research began as a PhD student at Princeton in 1998 under Professor Peter Sarnak, one the most versatile and influential mathematicians of our time. In his PhD thesis Venkatesh realized the first step of a program proposed by Langlands of counting automorphic forms by analytic methods. After completing his PhD in 2002, he was C. L. E. Moore Instructor at MIT for two years before being selected as Clay Research Fellow in 2004. He was then appointed as Associate Professor at the Courant Institute of Mathematical Sciences at NYU. In 2007 he was recognized with the Salem Prize and the Packard Fellowship. And now, just as he is turning 27, he has just been elevated to rank of Full Professor at Stanford University.

Venkatesh emerged as the top choice from a pool of brilliant young mathematicians from around the world. The international panel of experts who formed the 2008 SASTRA Ramanujan Prize Committee are: Chair - Krishnaswami Alladi (University of Florida), Manjul Bhargava (Princeton University), Bruce Berndt (University of Illinois at Urbana-Champaign), Jonathan Borwein (Dalhousie University, Canada and University of Newcastle, Australia), Stephen Milne (Ohio State University), Kannan Soundararajan (Stanford University), and Michel Waldschmidt (University of Paris).

Previous winners of the SASTRA Ramanujan Prize are Manjul Bhargava and Kannan Soundararajan in 2005 (two prizes), Terence Tao in 2006, and Ben Green in 2007. Thus the SASTRA Ramanujan Prize continues to recognize spectacular and path breaking research accomplishments by very young mathematicians.

Krishnaswami Alladi
Chair, 2008 SASTRA Ramanujan Prize Committee



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