ROMAN HOLOWINSKY TO RECEIVE 2011 SASTRA RAMANUJAN PRIZE

The 2011 SASTRA Ramanujan Prize will be awarded to Roman Holowinsky, who is now an Assistant Professor at the Department of Mathematics, Ohio State University, Columbus, Ohio, USA. This annual prize which was established in 2005, is for outstanding contributions by very young mathematicians to areas 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, Ergodic Theory and Dynamics at SASTRA University in Kumbakonam, India (Ramanujan's hometown) on December 22, Ramanujan's birthday.

Dr. Roman Holowinsky has made very significant contributions to areas which are at the interface of analytic number theory and the theory of modular forms. Along with Professor Kannan Soundararajan of Stanford University (winner of the SASTRA Ramanujan Prize in 2005), Dr. Holowinsky solved an important case of the famous Quantum Unique Ergodicity (QUE) Conjecture in 2008. This is a spectacular achievement.

In 1991, Zeev Rudnick and Peter Sarnak formulated the QUE Conjecture which in its general form concerns the correspondence principle for quantizations of chaotic systems. One aspect of the problem is to understand how waves are influenced by the geometry of their enclosure. Rudnick and Sarnak conjectured that for sufficiently chaotic systems, if the surface has negative curvature, then the high frequency quantum wave functions are uniformly distributed within the domain. The modular domain in number theory is one of the most important examples, and for this case, Holowinsky and Soundararajan solved the holomorphic QUE conjecture.

The manner in which this solution came about is amazing. Since 1991, many mathematicians had attacked this problem and made major advances. Luo and Sarnak reduced the problem to obtaining good estimates for certain shifted convolution sums. Elon Lindenstrauss proved the QUE conjecture for Maass forms, but the problem for holomorphic domains remained open. By a study of Hecke eigen values and an ingenious application of the sieve, Dr. Holowinsky obtained critical estimates for shifted convolution sums and this almost settled the QUE conjecture except in certain cases where the corresponding L-functions behave abnormally. Simultaneously, Soundararajan who approached the problem from an entirely different direction, and was able to confirm the conjecture in several cases, noticed that the exceptional cases not fitting Holowinsky's approach, were covered by his techniques. Thus by combining the approaches of Holowinsky and Soundararajan, the holomorphic QUE Conjecture was fully resolved in the modular case. The joint work of Holowinsky and Soundararajan appeared in the Annals of Mathematics (2010), and the two papers of Holowinsky on "A sieve method for shifted convolution sums" and "Sieving for mass equidistribution" appeared in the Duke Mathematical Journal (2009), and Annals of Mathematics (2010), respectively.

The QUE Conjecture and its resolution in the modular case is a fine example great mathematical work inspired by a problem in physics. The QUE Conjecture has connections with several important areas within mathematics - the Generalized Riemann Hypothesis, Poincare series, Maass forms, cusp forms, the Sato-Tate conjecture - to name a few. Dr. Holowinsky has been pursuing some of these connections in depth. In another paper that appeared in Inventiones Mathematicae (2010), Holowinsky with Valentin Blomer obtain bounds for sup norms of Maass cusp forms of large level.

Roman Holowinsky was born on July 26, 1979. He obtained a Bachelors in Science Degree from Rutgers University in 2001. He continued at Rutgers to do his doctorate and received his PhD in 2006 under the direction of Professor Henryk Iwaniec. Already in his PhD thesis entitled "Shifted convolution sums and Quantum Unique Ergodicity" he made major advances towards the QUE Conjecture. He held post-doctoral visiting positions at the Institute for Advanced Study, Princeton (2006-07), and (2009-10), the Fields Institute, Toronto (2008), the University of Toronto (2007-09), and before joining the permanent faculty at Ohio State University. At the young age of 32, Dr. Holowinsky is a major figure in the fields of analytic number theory and the theory of modular forms. His resolution of the QUE Conjecture in the modular case with Soundararajan, and his own work on shifted convolution sums is a spectacular achievement of lasting value. In recognition of this, he was awarded the prestigious Alfred P. Sloan Foundation Fellowship in 2011.

Roman Holowinsky was the unanimous choice of the SASTRA Ramanujan Prize Committee to receive the award this year. The international panel of experts who formed the 2011 Committee were: Chair - Krishnaswami Alladi (University of Florida), Frits Beukers (University of Utrecht), Benedict Gross (Harvard University), Christian Krattenthaler (University of Vienna), Ken Ono (Emory University), Robert Vaughan (The Pennsylvania State University), and Akshay Venkatesh (Stanford University).

Previous winners of the SASTRA Ramanujan Prize are Manjul Bhargava and Kannan Soundararajan in 2005 (two prizes), Terence Tao in 2006, Ben Green in 2007, Akshay Venkatesh in 2008, Kathrin Bringmann in 2009, and Wei Zhang in 2010. Thus Roman Holowinsky joins this impressive list of brilliant mathematicians who have made monumental contributions at a very young age.

Krishnaswami Alladi
Chair, 2011 SASTRA Ramanujan Prize Committee
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OTHER LINKS

- Report in The Hindu, India's National Newspaper, on the 2011 SASTRA Award Ceremony.

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