SASTRA Ramanujan Prize 2012

by Gonit Sora - Wednesday, September 12, 2012

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The **SASTRA Ramanujan Prize**, founded by Shanmugha Arts, Science, Technology & Research Academy (SASTRA) University in Kumbakonam, India, Srinivasa Ramanujan's hometown, is awarded every year to a young mathematician judged to have done outstanding work in Ramanujan's fields of interest. The age limit for the prize has been set at 32 (the age at which Ramanujan died), and the current award is $10,000.

The following is the announcement of the 2012 prize:

The 2012 SASTRA Ramanujan Prize will be awarded to **Professor Zhiwei Yun**, who has just completed a C. L. E. Moore Instructorship at the Massachusetts Institute of Technology and will be taking up a faculty position at Stanford University in California this fall. The SASTRA Ramanujan Prize was established in 2005 and is awarded annually 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. Because 2012 is the 125th anniversary of the birth of Srinivasa Ramanujan, the prize will be given in New Delhi (India's capital) on December 22 (Ramanujan's birthday), during the concluding ceremony of the International Conference on the Legacy of Ramanujan conducted by the National Board of Higher Mathematics of India and co-sponsored by SASTRA University and Delhi University. Dr. Yun will also be invited to speak at the International Conference during December 14-16 at SASTRA University in Kumbakonam (Ramanujan's hometown) where the prize has been given annually in previous years.

Dr. Zhiwei Yun has made fundamental contributions to several areas that lie at the interface of representation theory, algebraic geometry and number theory.

Yun's PhD thesis on global Springer theory at Princeton University, written under the direction of Professor Robert MacPherson of The Institute for Advanced Study, is opening up whole new vistas in the Langlands program, which represents one of the greatest developments in mathematics in the last half-century. Springer theory is the study of Weyl group actions on the cohomology of certain subvarieties of the flag manifold called Springer fibers. Yun's global Springer theory deals with Hitchin fibers instead of Springer fibers (taking the lead from earlier work on Hitchin fibers by Gérard Laumon and the 2010 Fields Medalist Bao-Châu Ngô) which he uses to determine the actions of affine Weyl groups on cohomology. His work is expected to lead to a geometric and functorial understanding of the Langlands program. Many papers by him on global Springer theory have arisen from his PhD thesis; one has appeared in 2011 in *Advances in Mathematics* and another will soon appear in *Compositio Mathematica*.

Bao-Châu Ngô was awarded the 2010 Fields Medal for his proof of the Fundamental Lemma in the Langlands Program. Yun has made a major breakthrough in the study of the Fundamental Lemma formulated by Jacquet and Rallis in their program of proving the Gross-Prasad conjecture on relative trace formulas. Yun's understanding of Hitchin fibrations enabled him to reduce the Jacquet-Rallis fundamental

lemma to a cohomological property of the Hitchin fibration. This work, considered a gem of mathematics, appeared in 2011 in the *Duke Mathematical Journal*.

Yun has collaborated with Ngô and Jochen Heinloth on a seminal paper on Kloosterman sheaves for reductive groups which will appear in the *Annals of Mathematics*. In this wonderful joint paper, Ngô, Heinloth and Yun reprove a unicity result of Gross on automorphic representations over the rational function field, and use the geometric Langlands theory to the construction of l-adic local systems.

Yun has also done significant work in algebraic geometry. His recent article with Davesh Maulik on the Macdonald formula for curves with planar singularities will appear in *The Journal für die Reine und Angewandte Mathematik*. Yun's most recent work on the uniform construction of motives with exceptional Galois groups is considered to be a fundamental breakthrough. A construction like Yun's was sought by Fields Medalists Serre and Grothendieck for over 40 years, and Yun's work is considered one of the most exciting developments in the theory of motives in the last two decades.

Zhiwei Yun was born in Changzhou, China in 1982. He showed his flair for mathematics early by winning the Gold Medal in the 41st Mathematical Olympiad in 2000 in Korea. He joined Peking University in 2000 on a Ming-De Fellowship and obtained a bachelor's degree there in 2004. He continued his studies at Princeton University, where he received his PhD in 2009. He was Visiting Member at the Institute for Advanced Study in 2009-10, and held the C.L. E. Moore instructorship at MIT during 2010-12. In fall 2012, he will join the mathematics faculty at Stanford University. At the age of 30, he has established himself as one of the young leaders of modern mathematics.

The international panel of experts who formed the 2012 Prize Committee were: Krishnaswami Alladi (chair), University of Florida; Frits Beukers, University of Utrecht; Kathrin Bringmann, University of Cologne; Benedict Gross, Harvard University; Kenneth Ribet, University of California, Berkeley; Robert Vaughan, The Pennsylvania State University; and Ole Warnaar, University of Queensland.

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, Wei Zhang in 2010, and Roman Holowinsky in 2011. Thus Zhiwei Yun joins an impressive list of brilliant mathematicians who have made monumental contributions at a very young age.

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Krishnaswami Alladi
Chair, 2012 SASTRA Ramanujan Prize Committee
August 27, 2012

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