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## **TERENCE TAO TO RECEIVE** 2006 SASTRA RAMANUJAN PRIZE

The 2006 SASTRA Ramanujan Prize will be awarded to Professor Terence Tao of the University of California at Los Angeles (UCLA). This annual prize, which was launched 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 Combinatorics, Dec 19-22, at SASTRA University in Kumbakonam, India, Ramanujan's hometown

Professor Tao has made path-breaking contributions in number theory, harmonic analysis, representation theory, and partial differential equations. His work has had major impact in combinatorics and ergodic theory as well. In the course of making significant progress on fundamental long-standing problems in these different areas. Tao has collaborated with a wide range of mathematicians

One of Tao's most notable contributions is to the famous Kakeya Problem in higher dimensions, which has major applications in Fourier analysis and partial differential equations. One important aspect of the problem is to determine the fractal dimension of the set generated by rotating a needle in n-dimensional space. In joint work with Nets Katz, Izabella Laba and others, Tao significantly improved all previously known estimates for the fractal dimension using new and surprisingly simple combinatorial ideas in an ingenious way. Another of Tao's outstanding contributions is his joint work with Ben Green on long arithmetic progressions of prime numbers. One of the deepest results in this area is a theorem of the Hungarian mathematician Szemeredi which asserts that any set of positive integers which has positive density will have arbitrarily long arithmetic progressions. Another proof of Szemered's theorem using very different ideas was given by 1998 Fields Medallist Timothy Gowers. Szemeredi's theorem does not apply to the primes which, due to their spareseness, have density zero. Nevertheless it was conjectured that there are arbitrarily long arithmetic progressions of prime numbers and this was proved by Tao and Green by combining methods of ergodic theory with the ideas of Gowers

Yet another fundamental contribution of Tao concerns the sum-product problem which is due to the late Paul Erdos, one of the greatest mathematicians of the twentieth century, and his brilliant protege Szemeredi. Roughly speaking, this problem of Erdos and Szemeredi states that either the sumset or the product set of any set of N numbers must be large. Tao was the first to recognize the significance of this problem in combinatorial number theory and harmonic analysis. In collaboration with 1994 Fields Medallist Jean Bourgain and Nets Katz, Tao made important generalizations and refinements of the original Erdos-Szemeredi problem. This "sum-product theory" has become one of the key ingredients in many recent breakthroughs in harmonic analysis and number theory

Tao's work has also provided a fresh look at on the properties of wave maps which occur naturally in Einstein's theory of general relativity. In other contributions that have major impact in physics, Tao and collaborators have provided new insights in the theory of Schroedinger equations, which for example, are used to describe the behaviour of light in an optical cable. Finally, in collaboration with Allen Knutson, Tao solved the wellknown saturation conjecture in representation theory. Thus, at this very young age of 31, Tao is one of the most versatile mathematicians of our generation.

Tao was born in Adelaide, Australia in 1975 and lived there until 1992. He did his BSc. (Honours) and MSc at Flinders University of South Australia. He then went to Princeton University in 1992 for his PhD, which he completed in 1996 under the direction of Professor Elias Stein. He received a Sloan Dissertation Fellowship for the final year of his PhD work. He is currently professor at the University of California in Los Angeles.

Honours have come in a steady stream to Tao in the past few years. For his fundamental work in analysis, he was the recipient of the Salem Prize in 2000. He also received the Bocher Prize of the American Mathematical Society (AMS) in 2002, and the AMS Conant Prize in 2005. And in August 2006, at the International Congress of Mathematicians in Madrid, Tao was awarded the prestigious Fields Medal. Following that. Tao was awarded the MacArthur Fellowship.

Tao emerged as the top choice for the SASTRA Prize from a pool of brilliant young mathematicians from around the world. The international panel of experts who formed 2006 SASTRA Ramanujan Prize Committee are: Chair - Krishnaswami Alladi (University of Florida), George Andrews (The Pennsylvania State University), Manjul Bhargava (Princeton University), James Lepowsky (Rutgers University), Tom Koornwinder (University of Amsterdam), Kannan Soundararajan (University of Michigan and Stanford University), and Michel Waldschmidt (University of Paris).

By awarding the first SASTRA Ramanujan Prizes to Manjul Bhargava and Kannan Soundararajan in 2005, an exceptionally high standard was set. This is now continued with the award of the 2006 SASTRA Prize to Terence Tao.

> Krishnaswami Alladi Chair, 2006 SASTRA Ramanujan Prize Committee

## OTHER LINKS

- Alladi's article in The Hindu, India's National Newspaper, on Tao's SASTRA Prize Lecture
- Photos of the 2006 SASTRA Prize Ceremony at the Int'I Conf on Number Theory and Combinatorics in Kumbakonam, Ramanujan's hometown.

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