Premios

Otorgados

* Fields Medals ICM2006

Andrei Okounkov, Fields Medalist: "for his contributions bridging probability, representation theory and algebraic geometry".

The work of Andrei Okounkov has revealed profound new connections between different areas of mathematics and has brought new insights into problems arising in physics. Although his work is difficult to classify because it touches on such a variety of areas, two clear themes are the use of notions of randomness and of classical ideas from representation theory. This combination has proven powerful in attacking problems from algebraic geometry and statistical mechanics.

Andrei Okounkov was born in 1969 in Moscow. He received his doctorate in mathematics from Moscow State University in 1995. He is a professor of mathematics at Princeton University. He has also held positions at the Russian Academy of Sciences, the Institute for Advanced Study in Princeton, the University of Chicago, and the University of California, Berkeley. His distinctions include a Sloan Research Fellowship (2000), a Packard Fellowship (2001), and the European Mathematical Society Prize (2004).

http://icm2006.org/AbsDef/ts/Felder-AO.pdf

Grigori Perelman, Fields Medalist: "for his contributions to

geometry and his revolutionary insights into the analytical and geometric structure of the Ricci flow".

The name of Grigori Perelman is practically a household word among the scientifically interested public. His work from 2002-2003 brought groundbreaking insights into the study of evolution equations and their singularities. Most significantly, his results provide a way of resolving two outstanding problems in topology: the Poincare Conjecture and the Thurston Geometrization Conjecture. As of the summer of 2006, the mathematical community is still in the process of checking his work to ensure that it is entirely correct and that the conjectures have been proved. After more than three years of intense scrutiny, top experts have encountered no serious problems in the work (Further information at www.icm2006.org)

Grigori Perelman was born in 1966 in what was then the Soviet Union. He received his doctorate from St. Petersburg State University. During the 1990s he spent time in the United States, including as a Miller Fellow at the University of California, Berkeley. He was for some years a researcher in the St. Petersburg Department of the Steklov Institute of Mathematics. In 1994, he was an invited speaker at the International Congress of Mathematicians in Zurich.

http://icm2006.org/AbsDef/ts/Lottlight-GP.pdf

Terence Tao, Fields Medalist: "for his contributions to partial differential equations, combinatorics, harmonic analysis and additive number theory".

Terence Tao is a supreme problem-solver whose spectacular work has had an impact across several mathematical areas. He combines sheer technical power, an other-worldly ingenuity for hitting upon new ideas, and a startlingly natural point of view that leaves other mathematicians wondering, "Why didn't anyone see that before?". His interests range over a wide swath of mathematics, including harmonic analysis, nonlinear partial differential equations, and combinatorics. (Further information at www.icm2006.org)

Terence Tao was born in Adelaide, Australia, in 1975. He received his PhD in mathematics in 1996 from Princeton University. He is a professor of mathematics at the University of California, Los Angeles. Among his distinctions are a Sloan Foundation Fellowship, a Packard Foundation Fellowship, and a Clay Mathematics Institute Prize Fellowship. He was awarded the Salem Prize (2000), the American Mathematical Society (AMS) Bocher Prize (2002), and the AMS Conant Prize (2005, jointly with Allen Knutson). At 31 years of age, Tao has written over 80 research papers, with over 30 collaborators.

http://icm2006.org/AbsDef/ts/Fefferman-TT.pdf

Wendelin Werner, Fields Medalist: "for his contributions to the development of stochastic Loewner evolution, the geometry of two-dimensional Brownian motion, and conformal field theory".

The work of Wendelin Werner and his collaborators represents one of the most exciting and fruitful interactions between mathematics and physics in recent times. Werner's research has developed a new conceptual framework for understanding critical phenomena arising in physical systems and has brought new geometric insights that were missing before. The theoretical ideas arising in this work, which combines probability theory and ideas from classical complex analysis, have had an important impact in both mathematics and physics and have potential connections to a wide variety of applications. (Further information at www.icm2006.org)

Born in 1968 in Germany, Wendelin Werner is of French nationality. He received his PhD at the University of Paris VI in 1993. He has been professor of mathematics at the University of Paris-Sud in Orsay since 1997. From 2001 to 2006, he was also a member of the Institut Universitaire de France, and since 2005 he has been seconded part-time to the Ecole Normale Supèrieure in Paris. Among his distinctions are the Rollo Davidson Prize (1998), the European Mathematical Society Prize (2000), the Fermat Prize (2001), the Jacques Herbrand Prize (2003), the Loève Prize (2005) and the Pólya Prize (2006).

http://icm2006.org/AbsDef/ts/Newman-WW.pdf

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* Jon Kleinberg, Nevanlinna Prize Winner

The Nevanlinna Prize has been awarded every four years since 1982 in recognition of the most notable advances made in mathematics in the Information Society (e.g. computational science, programming languages, algorithm analysis, etc.). This prize consists of a gold medal bearing the profile of Rolf Nevanlinna (1895-1980), rector of the University of Helsinki and president of the IMU (International Mathematical Union). Nevanlinna was the first mathematician to introduce computation into Finnish universities in 1950.

Jon Kleinberg's work has brought theoretical insights to bear on important practical questions that have become central to understanding and managing our increasingly networked world. He has worked in a wide range of areas, from network analysis and routing, to data mining, to comparative genomics and protein structure analysis. In addition to making fundamental contributions to research, Kleinberg has thought deeply about the impact of technology, in social, economic, and political spheres. (Further information at www.icm2006.org)

Jon Kleinberg was born in 1971 in Boston, Massachusetts, USA. He received his Ph.D. in 1996 from the Massachusetts Institute of Technology. He is a professor of computer science at Cornell University. Among his distinctions are a Sloan Foundation Fellowship (1997), a Packard Foundation Fellowship (1999), and the Initiatives in Research Award of the U.S. National Academy of Sciences (2001). In 2005, Kleinberg received a MacArthur "genius" Fellowship from the John D. and Catherine T. MacArthur Foundation.

http://icm2006.org/AbsDef/ts/Hopcroft-JK.pdf

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* Kiyoshi Itô, Carl Friedrich Gauss Prize Winner

Carl Friedrich Gauss (1777-1855), one of the greatest mathematicians of all times, is not only known for achievements in very abstract fields like number theory. He also created tools that serve the physicist as well as the engineer or everybody who wants to draw conclusions from measurements of all kinds, with their inevitable inaccuracies. They all use Gauss's "least squares method" to find the correct numbers behind huge amounts of unreliable data. Mathematics is not just playing around with building blocks invented for that purpose. It has a profound impact to virtually all sciences and, more or less indirectly, to technology, business and everyday life. To improve the public awareness of this fact, the Gauss prize was created.

The prizewinner is the Japanese mathematician Kiyoshi Itô, aged 90, and the subject of his prize-honored work is doubtlessly connected to everyday life: it is chance, those tiny, unpredictable effects that decide which way a die falls or a roulette ball rolls. Of course, it is impossible to predict the unpredictable; nevertheless, you can do statistics to determine, e. g., the probability of getting three sixes in a row by tossing a die three times, the expected time until your complete ruin if you keep gambling in a casino, or, more seriously, the likelihood that a success in a new form of medical treatment is due to a new drug and not just to chance. The kind of chance Itô worked on, however, is a particularly wild and pure one. Unlike in tossing a die where the unpredictability is confined to wellseparated, "discrete" events, this kind of chance can strike at any time. The prototypic example is the so-called Brownian motion. Small pollen grains or dust particles exhibit an erratic motion that can be viewed under the microscope due to collisions with water molecules that are themselves invisible. The mathematical model of this kind of motion is called a stochastic process. The random forces that keep the particle moving are blind and without memory; this means, they don't care for the actual position of the particle they are pushing around, and they don't even remember when they hit the last time. This is completely reasonable if you think of water molecules - how could they remember? -, but at the same time it renders a Brownian path a very difficult mathematical object. In technical terms, it is nowhere differentiable and its length is infinite. Even those properties don't prevent you from doing basic statistics. So you can deduce that the expected distance of a Brownian particle from its initial position grows proportional to the square root of the time. But if random and classical (deterministic) forces act together or if you want to control the particle's path, e. g. to counteract its random movement, classical mathematical tools are bound to fail. This was remedied by Kiyoshi Itô who, beginning in the 1940s, developed a completely new mathematical formalism named stochastic analysis. It allowed mathematicians to formulate that mixture of random and deterministic forces in a so-called stochastic differential equation and even to solve those equations, in a sense. Itô's theory is sufficiently abstract to apply to fields that are completely different from the motion of dust in water. Stock prices on the financial market are subject to random forces not unlike those that act in a Brownian motion. Bankers who try to counteract the effects of those fluctuations find themselves forced to trade "in continuous time", at least in theory. Out of Itô's ideas grew a strategy for continuous trading and, eventually, a formula to calculate the price of an option. Today the Black-Scholes formula underlies almost all financial transactions that involve options or futures; moreover, it won two of its inventors the 1997 Nobel prize in economics. Beyond particle positions and share prices, Itô's theory applies also to the size of a population of living organisms, to the frequency of a certain allele within the gene pool of a population, or even more complex biological quantities. Due to Itô's work, biologists can assess the probability with which a gene will dominate the whole population or a species will survive. It took mathematicians themselves quite a while to appreciate the importance of Itô's results. This is partially due to Japan's isolation during World War II. Only from 1954 on, Itô lectured on his achievements at the Institute of Advanced Studies in Princeton. Today, there is no doubt that stochastic analysis is a rich, important and fruitful branch of mathematics with a formidable impact to "technology, business, or simply people's everyday lives".

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http://www.icm2006.org/imuawards

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* Trieste Science Prize for 2006

This marks the second year of the Trieste Science Prize. The prize is designed to bring recognition and distinction to the developing world's most eminent scientists who have not yet been honoured by other international award schemes dedicated to honouring scientific achievement. It is named after Trieste, a city in northeast Italy that has made fundamental contributions to the promotion of science in the developing world. Individuals who have received the Nobel Prize, the Tokyo/Kyoto Prize, the Craaford Prize or the Abel Prize are not eligible. The prize is given annually and rotates among the following scientific fields: biological sciences and physics/astrophysics (2005); mathematics and medical sciences (2006); agricultural sciences and chemistry (2007); and earth and engineering sciences (2008).

www.twas.org/honor/TSP_info.html

This year, Illycaffè and the Academy of Sciences for the Developing World (TWAS) have joined forces to honour four eminent scientists from the developing world. Two medical researchers who have made fundamental contributions to our understanding and prevention of lethal infectious diseases and two mathematicians who have shed light on some of the world's most mind-boggling mathematical problems have won the Trieste Science Prize for 2006.

http://www.ictp.trieste.it/ twas/bra06/brazil2006.html

Winners

Jacob Palis has been one of the world's foremost mathematicians in the fields of multi-variable dynamical systems, a sector of mathematics that tries to understand how nonlinear complex phenomena behave over the long term. Such studies have helped enhance our understanding of population growth patterns, global climate change and even fluctuations in the stock market. Palis has also been a driving force behind efforts to strengthen the study of mathematics in Latin America. He served as the director of the Institute of Pure and Applied Mathematics in Rio de Janeiro for more than a decade, transforming the institution into a world-class centre for mathematical research and Latin America's foremost institution for the training of young mathematicians.

C. S. Seshadri is being honoured for the prominent role he has played in shaping the field of algebraic geometry, one of the dominant fields in 21st

century mathematics. He is a leading figure in such cutting-edge topics as the theory of vector bundles and quotient and compact homogenous spaces. He is recognized as the creator of the Standard Monomial Theory and Seshadri Constant, which have found important applications both in mathematics and physics. Seshadri has also been the leading force behind the creation of the Chennai Mathematical Institute, which over the past decade has emerged as one of world's pre-eminent centres for mathematics.

More Information: TWAS, www.twas.org/honor/TSP_info.html
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