Fields Medal:
Nobel Prize for Young Mathematicians

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John Charles Fields

FIELDS Medal is often described as the "Nobel Prize of Mathematics" for the prestige it carries. However, there are a number of differences between the two.

The Nobel Prize is referred to as "a life boat thrown at a person who has already reached the shore", because in most cases the recipient is already a very famous and well-established person in his field and the prize is merely a recognition, which does not serve as an incentive for him. Critics also sarcastically say that to get it one of the most important criteria is "long life", as most of the awardees are usually very aged and are at the fag end of their lives.

In contrast, the Fields Medal is awarded to young mathematicians, whose 40th birthday falls after the 1st of January of the year in which the award is conferred. Therefore, not only does it carry recognition for original work, but also provides incentive to serve as a stimulus for renewed efforts to work along the line for the rest of their lives.

Besides, unlike the Nobel Prizes, which are awarded every year, the Fields Medal is given every four years.

The Award

The Fields Medal was conceived by the famous Canadian mathematician John Charles Fields. Its first winners were Lars Ahlfors of Finland and Jesse Douglas of the US, who won in 1936. Thereafter, from 1950 it has regularly been awarded every four years during the International Congress of the International Mathematical Union (IMU). So far, 52 young creative geniuses belonging to 15 countries, whose contributions have made wide impacts in the field of mathematics, have received it.

Besides the medal and a citation, it also carries a monetary award of US $ 15,000. No doubt it is much less as compared to the 1.5 million US dollar Nobel Prize, but that does not erode the importance of the Fields Medal, because it is awarded by a highly prestigious body like the IMU.

The Medal

The Fields Medal was designed by a Canadian sculptor R. Tait McKenzie. Its obverse carries the image of Archimedes and a quote attributed to him, which reads "Transire suum pectus mundoque potiri" in Latin, whose English translation is "Rise above oneself and grasp the world". Similarly, the Latin inscription on its reverse side reads "Congregati Ex Toto Orbe Mathematici Ob Scripta Insignia Tribuere". In English it can be translated as "The Mathematicians having congregated from the whole world awarded because of outstanding writing".

The background of the medal has a representation of Archimedes' tomb along with a carving illustrating his theorem on the spheres and cylinders, behind a branch of a tree. Its rim carries the name of the awardee.

Recent Awardees

The four brilliant young mathematicians who recently received the Fields Medal at the latest International Congress of the IMU, held at Hyderabad (India) in August are Elon Lindenstrauss of Israel, Ngo Bao Chau of Vietnam, Stanislav Smirnov of Russia and Cedric Villani of France.

Lindenstrauss was nominated for the award "For his results on measure rigidity in ergodic theory and their applications to number theory". Ergodic theory is a field of mathematics initially developed to understand celestial mechanics. It studies dynamical systems, which are simply mathematical rules that describe how a system changes over time. Lindenstrauss developed powerful theoretical tools and used them to solve a series of striking problems in areas of mathematics that are seemingly far afield. These methods are expected to give continuous insights throughout mathematics for decades to come.

Chau received the medal "For his proof of the Fundamental Lemma in the theory of automorphic forms through the

Obverse side of Medal (top), Reverse side of Medal

LIST OF FIELDS MEDALISTS

Year	Location of International Congress (IMU)	Name of the Medalist	Country	Remarks
1936	Oslo, Norway	Lars Ahlfors Jesse Douglas	Finland USA	
1950	Cambridge, US	Laurent Schwartz Atle Selberg	France Norway	
1954	Amsterdam, Netherlands	Kunihiko Kodaire Jean-Pierre Serre	Japan France	Serre is the youngest winner (27 years).
1958	Edinburg, UK	Klaus Roth Rene Thom	UK France	
1962	Stockholm, Sweden	Lars Hormander John Milnor	Sweden USA	
1966	Moscow, USSR	Michael Atiyah Paul Joseph Cohen Alexander Grothendieck Stephen Smale	UK USA France USA	Grothendieck boycotted the ceremony held in Moscow to protest Soviet military action in East Europe.
1970	Nice, France	Alan Baker Heisuke Hironaka Sergei Novikov John G. Thompson	UK Japan Soviet Union USA	Novikov was unable to travel to the Congress due to restrictions placed on him by Soviet Government.
1974	Vancouver, Canada	Enrico Bombieri David Mamford	Italy USA	
1978	Helsinki, Finland	Pierre Deligne Charles Fefferman Grigory Margulis Daniel Quillen	Belgium USA Soviet Union USA	Margulis also could not receive the medal due to the same reason. Jacques Tits received it on his behalf.
1982	Warsaw,	Alain Connes William Thurston Shing-Tung Yau	France USA USA	The Congress could not be held in 1982. Rescheduled in 1983.
1986	Berkeley, US	Simon Donaldson Gerd Faltings Michael Freedman	UK Germany USA	
1990	Kyoto, Japan	Vladimir Drinfel'd Vaughan F.R.Jones Shigefumi Mori Edward Witten	Soviet Union New Zealand Japan USA	Witten became the first and so far the only physicist to win the award.
1994	Zurich, Switzerland	Jean Bourgain Pierre-Louis Lions Jean-Christophe Yoccoz Efim Zelmanov	Belgium France France Russia	
1998	Berlin, Germany	Richard Borcherds Timothy Gowers Maxim Kontsevich Curtis T.McMullen	UK UK Russia USA	Andrew Wiles recieved silver plaque "Quantized Fields Medal"as he was more than 40 years old.
2002	Beijing, China	Laurent Lafforgue Vladimir Voevodsky	France Russia	
2006	Madrid, Spain	Andrei Okounkov Grigoi Perelman Terence Tao Wendelin Werner	Russia Russia Australia France	Perelman refused the medal and did not attend the Congress.
2010	Hyderabad, India	Elon Lindenstrauss Ngo Bao Chau Stanislav Smirnov Cedric Villani	Israel Vietnam Russia France	
2014	Seoul, South Korea			

introduction of new algebro-geometric methods". It is considered as a corner stone of the subject. As a result, Chau removed one of the great impediments to a grand, decade-long programme to uncover hidden connections between seemingly disparate areas of mathematics. Therefore, he provided a solid foundation for a large body of theory and developed techniques that are likely to unleash a flood of new results.

The honour was bestowed upon Smirnov "For his igneous and astonishing work on the existence and conformal invariance of scaling limits or continuum limits of lattice model in statistical physics". The work confirms rigorously, what so far was accepted on merely heuristic grounds. His success in analyzing lattice model in statistical physics will be a stimulus for further work.

The last but not the least, Villani attracted the nomination "For his proofs of non-linear Landau damping and convergence of equilibrium for Boltzmann equation". Formulated by Ludwig Boltzmann (1872), the equation named after him is not time-reversible. According to it, the molecules (gaseous) almost always go from a state of greater order (e.g., enclosed in a beaker) to less order (e.g., spread around the room). It means the entropy increases, but then the question comes – how quickly? Villani and his co-workers, through mathematical models, found an answer that though entropy always increases, sometimes it does so faster and sometimes slower.

They also brought a deep understanding of another controversial theory of the Soviet physicist Lev Davidovich Landau's claim that under certain circumstances a phenomenon can approach equilibrium without increasing entropy.

Much of Villani's works are his profound mathematical interpretation of the physical concept of entropy, which he has applied to solve a number of major problems inspired by physics. Furthermore, his results have fed back into mathematics, enriching both the fields.

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