ICM 2010
HYDERABAD • INDIA
REFLEXIONS
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No mathematics event gets bigger than this

Where the World's Best Minds Get Together

Geethanjali Monto / Richa Malhotra

Photo: Rahul V Pisharody

Proud Moment : President Pratibha Patil with the Fields Medalists after the Inauguration of ICM. Governor E.S. Narasimhan and Chief Minister K Rosaiah of AP are also seen.

The biggest conference in mathematics – International Congress of Mathematicians (ICM) – was inaugurated today, on the 19th of August at the Hyderabad International Convention Centre, by Srimati Pratibha Patil, the President of India. Prof. László Lovász (President, International Mathematical Union (IMU)), Dr. K. Rosaiah and Mr. E. S. Narasimhan (Chief Minister and Governor of Andhra Pradesh, respectively), Prof. Martin Grötschel (Secretary, IMU), Prof. M. S. Raghunathan (Chairman, Executive Organizing Committee), Prof. Louis Nirenberg, Prof. Rajat Tandon (Secretary, Executive Organizing Committee), Prof. Seyed E. Hasnain (Vice-Chancellor, University of Hyderabad), were also present. Over 3000 delegates attended the event.

Prof. László Lovász said, 'ICM is an old tradition, more than a century old.' He indicated that it serves as a forum for discussion of important issues in mathematics and was an occasion for the IMU to award their main prizes. The tough competition to host the ICM was won by India this year. India has a long tradition in mathematics said Lovász and cited Bhaskara and Ramanujan. He said that this event should contribute to the development of mathematical research and education throughout the world.

Dr. K. Rosaiah cited a famous Telugu proverb meaning 'one who is good at calculations is a great man.' He said, 'The Congress will focus on the importance of mathematics as a discipline as well as a tool in Science and Technology and in many other practical matters'. He further added that ICM will focus public attention on mathematics.

Prof. M. S. Raghunathan said that the ICM being held in India is of historical significance and that it was an opportunity to interact with the best mathematical minds.

The IMU awards were endowed upon the winners by the President of India. The Fields Medals were awarded to Elon Lindenstrauss (Hebrew University, Jerusalem, Israel), Ngô Bảo Châu (Université Paris-Sud, Orsay, France), Stanislav Smirnov (Université de Genève, Switzerland) and Cédric Villani (Institut Henri Poincaré, Paris, France).

The Rolf Nevanlinna Prize was presented to Daniel Spielman of Yale University, USA. The Carl Friedrich Gauss Prize for applications of mathematics was awarded to Yves Meyer. The first recipient of the Chern Medal Award was Louis Nirenberg (Courant Institute of Mathematical Sciences, New York University).

Srimati Pratibha Patil congratulated the prize winners and said that she was exhilarated to be among mathematical scholars. She mentioned that the Pythagoras theorem appears many times in ancient Indian texts and remembered Indian mathematicians like Aryabhata, Brahmagupta, Bhaskara, Madhava and Srinivasa Ramanujan. She pointed out that mathematics is an integral part of India's science policy and plays a role in information technology, industry and finance.

The Indian President quoted a Sanskrit verse which says that mathematics stands at the top of all sciences akin to the crest of the peacock and the jewel of the serpent. She also recalled Jawaharlal Nehru's remark on the importance of scientific temper.

The IMU President László Lovász then followed the tradition of remembering some colleagues who have passed away in the past four years: Prof. Henri Cartan, Prof. Vladimir Arnold and Prof. Kiyosi Ito. He also revealed the members of the ICM Program Committee with Prof. Hendrik W. Lenstra as the Chair. He announced Prof. M. S. Raghunathan as the President of this ICM.

Prof. Lovász disclosed the new IMU President (2011–14) as Ingrid Daubechies, the venue for the next ICM as South Korea, and the site for the IMU permanent office as Berlin, Germany. He also indicated the laudators for the award winners and mentioned that the Leelavati prize would be awarded at the closing ceremony.

Prof. Lovász touched upon the other prizes connected with the IMU, namely the Abel and the Ramanujan Prizes. He also released the *Hyderabad Intelligencer* on the special occation of ICM 2010.

Prof. Martin Grötschel called attention to a report 'Citation Statistics about the use and misuse of citation data in assessment of scientific research.'

He also mentioned that information on all previous ICM speakers and all ICM proceedings are available online in a searchable collection on the IMU website www.mathunion.org. The most famous paper in this collection is 'Sur les problèmes futurs des mathématiques' where Hilbert (in 1900) outlined the 23 problems.

Media Meets Medalists

Richa Malhotra

A Press Conference was held after the Awards Ceremony of the IMU Prizes. The media was addressed by the Award Winners of the Fields Medal, the Gauss Prize, the Chern Medal and the Nevanlinna Prize. Prof. László Lovász, Prof. Martin Groetschel, Prof. Wolfgang Dahmen, Prof. M. S. Raghunathan, Prof. Ravindran Kannan, Prof. Ingrid Daubechies, Prof. Robert Bryant and Prof. Rajat Tandon accompanied the awardees to address questions of the press.

Mr. R. Ramachandran mediated the proceedings of the Press Conference. The selection process of choosing the winners of the Fields Medal was described briefly by Prof. Lovász. He said: "Awards fall into two categories: The four Fields Medals and the Nevannlina Prize are for the researchers under 40, who have got specific results as mentioned in the citations of the winners. This is important because it focuses on the most recent developments; and the Gauss Prize and the Chern Medal are given for life-long achievements; the Gauss Prize for connection with applications and the Chern Prize for scientific achievements, not necessarily directly applicable."

When questioned by the media about whether the reason for the increase in the number of awards is to draw attention to mathematics, Prof. Lovász replied that one of the aims of the awards is that it focuses on the fact that mathematics as a subject is alive and that important results are being generated all the time; it dispels an unfortunate impression among general public that mathematics is already completed.

To a question as to whether mathematics is a male preserve, Daubechies had the following thoughts: "There is certainly no reason why women can't do mathematics. When women talk mathematics, we do in the same way. To do mathematics you need lots of time in which you are free to think. Women mathematicians can only be created when they have lots of time. In situations where they have the demands of small children, it is not easy to do that. But, I am sure that when a man has such demands of a similar nature, he will find the same problem! So, it seems to me that it is a more of a cultural and societal thing and not whether you are a woman or a man."

When asked whether the awardees knew about winning the award much earlier or only recently, Smirnov promptly replied, "Prof. Lovász told me about the award in February and because I am a curious person, I asked him who are the other winners and he told me he is not supposed to tell. I don't know if anybody else was curious, but on a humorous note, we were sent a mail and so we played the game of guessing who is who". To the same question, Villani said, "When I received a phone call from Prof. Lovász, I have to admit that I waited for a few days to make sure that it was not a joke. There are famous stories of playing tricks from old times."

On a question as to whether the mathematicians' best work is done before they are 40, the awardees had the following views:

Smirnov: "As for young age, Karl Weierstrass wrote a famous influential textbook when he was 71. Maybe with experience and older age, you go to solve different problems."

Ngo: "As for mathematicians being active only under 40, I certainly hope not!"

To the question, "How much do the awardees understand the work of each other?"

Smirnov: "Mathematics is now a very big subject and this year is very good for analysis as most of the winners are working in analysis, so I understand the work of majority of us".

Lindenstrauss: "No one really knows completely even a tiny bit of mathematics but it is quite clear that there are connections between many parts of mathematics."

Spielman: "I have a slightly different opinion on this. We can understand each other's work at a l level but to understand deeply it takes, perhaps years."

Meyer: "You have to keep in mind that you are able to move to another subject. I have done that about four or five times in my mathematical life. I began with number theory and moved to other fields. When you move across frontiers, you introduce new ideas. In a given time you understand the world of mathematics but with many mistakes. You are able to travel across many branches of mathematics. There are always connections to move across from one subject to another."

Nirenberg: "At my age it becomes increasingly difficult to keep up with other people's work. But, like many mathematicians, I learnt a lot of mathematics by listening to people rather than reading. I also look forward to learning about the work of other people through such meetings."

Another question from the floor was, "How pure is pure mathematics?" to which some of the interesting answers were:

Spielman: "I will be hearing about a couple of talks in the ICM which are on pure mathematics motivated by applied mathematics."

Villani: "I completely agree with what has been said. With electronic communication and e-mail, communicating papers is much easier than it was earlier. At the same time, contact with each other and talking is much more efficient; so whatever the technology, as human beings, we need to talk to each other."

Lindenstrauss: "I have had several people ask me several times, what is what you do good for? I said that there are several uses but mathematics is a subject which takes a long time to show its usefulness elsewhere sometimes. Sometimes, completely miraculously some work you have done in a particular subject finds applications in other subjects like elliptic curves in cryptography."

Smirnov: "Indeed nowadays these boundaries between pure and applied mathematics is blurred. There are not only applications to questions which would be used in mobile phones but also potential applications to chemistry and physics etc. We can go back and forth; it is sort of miraculous and this is a good time for this type of interaction and it is also good for chemistry and biology."

Nirenberg: "I marvel at the influencing of one field on the other. For instance, in recent years physicists have introduced new ideas within pure mathematics!"

Villani: "Often the interaction between physics and mathematics goes in both directions. Sometimes applications and inspiration comes from everywhere to mathematics.

Meyer: The division between pure and applied mathematics doesn't exist any more. For instance, in image processing and medical image processing, one has practical problems which on linearizing gives rise to a problem of pure mathematics.

On the possibility of the whole mathematical community working on a fixed big problem together , Lovasz said, "In such congresses, there are survey talks which tell us where science is heading. Mathematics is very broad and goes in diverse directions. It cannot be compressed to a single large problem.

The Joy of winning

Ngo: With this prize, there will be betterment of mathematics and science in Vietnam.

Spielman: This is incredible! I like to think I am really very young!

Villani: Oh! It is immense pride and great pleasure! Very glad and also on behalf of my collaborators. So, I didn't really realize and almost didn't sleep last night ..I was so nervous!

Nirenberg: This is a great honour and also because Chern and I were friends for many years. So, it has been an enormous pleasure.

Meyer: It is because I have very good students and I have interacted with people like Ingrid Daubechies. The award is more for a group of friends.

'Mathematical Puzzles and Olympiads Have Always Been an Enjoyable Experience'

Stanislav Smirnov talks about his passion for mathematics in a tete-a-tete with B.Sury

Congratulations first ! Who influenced your mathematical taste before you went to work on your Ph.D. ?

Mathematical analysis is a very strong subject in St.Petersburg. Viktor Havin's seminar at the St. Petersburg State University inspired me to choose mathamatical analysis. He later became my undergraduate advisor.

I met my Ph.D. advisor, Nikolai Makarov, also in St. Petersburg, when he was giving a geometric function theory course for undergraduates. I was impressed by the subject and was glad when he offered his guidance for my Ph.D. at the California Institute of Technology.

You won perfect scores at International Maths Olympiads (IMOs) in 1986, 1987. How did you find those experiences? Did you also involve yourself in training students for IMOs later? Would you say that each person who does well at the IMOs is likely to do good mathematics research?

I always liked solving mathematical puzzles, and participating in mathematical Olympiads was a very enjoyable experience. Soviet Union was famous for its mathematical circles-out-of-school activities among school children interested in mathematics. I took part in one when I was at school, and that certainly influenced my decision to become a mathematician.

I was not directly involved in the IMO training myself, but together with Sergei Ivanov (who is an invited speaker at this ICM) I ran a mathematical circle and several of our students became winners of the IMO. Some of them went on to become mathematicians, and I was happy to see Anna Erschler also an invited speaker at the ICM 2010.

I would be wrong to say that good IMO scores lead to a successful mathematical career, for the latter needs more than just being able to solve problems fast. However, problem-solving abilities always help, and not only in mathematics. So mathematical circle or Olympiads experience is beneficial regardless of which profession you choose later on.

Stanislav Smirnov

- Viktor Havin's seminar at the St. Petersburg State University inspired me to choose mathematical analysis.

- I was always mostly interested in science or engineering, so i did not have to make any major sacrifices to follow a mathematics career.

- I was very fortunate to work in the Royal Institute of Technology with Lennart Carleson, who is one of my mathematical heroes.

Did you have to sacrifice other interests in order to follow a mathematics career? What are they?

I was always mostly interested in science or engineering, so there were no real sacrifices. Of course, there are very interesting things going on in other sciences, and it would be nice to try something besides mathematics one day.

What is the reason you moved to Stockholm and then to Geneva?

While studying in USA, I always thought of eventually returning to Europe, and Geneva is practically in the heart of it. I enjoyed my stay in Stockholm, and I was very fortunate to work in the Royal Institute of Technology with Lennart Carleson, who is one of my mathematical heroes.

Tell us something about your parents and how they individually played roles in shaping your future?

My father was a physicist and my mother was an engineer, so naturally they encouraged my interest in science. The biggest role was played by my grandfather, who was professor of engineering, but graduated as a mathemacian. He had to change his profession because of the Second World War. He invoked in me my love for mathematics and interest in problem-solving.

Is there anything that you find particularly fascinating or interesting about India?

For me the most fascinating things about India are how multicultural the country is, and how friendly and relaxed people are.

I notice that you have something called Physical mathematics and something called Mathematical Physics. Could you explain what you would say as the main differences?

The term "mathematical physics" has been in use for a very long time, and it is usually understood as applying mathematics to physical problems. We had mathematical physics seminars both in the physics and the mathematics departments, so we named the second one "Physical Mathematics" to distinguish them. I would understand this as areas of mathematics which are motivated by physics, often in a very indirect way.

Do you see the future of mathematics getting more and more intertwined with physics?

The interaction was and will continue to be very fruitful for both sciences. It is now growing, but I doubt it will ever encompass all areas of mathematics. It is astonishing how much of abstract mathematics is used in physics.

I think it was all summed up nicely in the famous piece "The Unreasonable Effectiveness of Mathematics in the Natural Sciences" by Eugene Wigner: "The miracle of the appropriateness of the language of mathematics for the formulation of the laws of physics is a wonderful gift which we neither understand nor deserve.

We should be grateful for it and hope that it will remain valid in future research and thatit will extend, for better or for worse, to our pleasure, even though perhaps also to our bafflement, to wide branches of learning." Little has changed since, so I only want to add that it is equally puzzling how successful physics is at suggesting directions of mathematical research.

Beyond mathematics, what would you consider the biggest challenge for mankind? I hope you don't find this a silly question.

If it is purely scientific questions, there are many good challenges in all sciences. From my amateurish point of view understanding appearance of life, consciousness, and languages seem to be the most difficult scientific challenges.

If you mean more global questions, I am not sure that I am the proper person to ask. But I think the world political, economical, industrial structures are dated and it is a big challenge to adapt them to 21st century so that the humankind can go on.

Faces of Mathematics

Photos: Rahul V Pisharody

What's Today @ ICM

Friday, August 20, 2010

09:30-12:30	Event connected to the Gauss and Chern Prizes Chair: **L. Lovasz,** President, IMU Hall 4
09:30-09:35	Welcome by President, IMU
09:35-09:45	Greetings from **J. Simons** (on video)
09:45-10:05	**May Chu** Prof. Chern-Reminiscences
10:05-10:35	**R. Bryant** S. S. Chern-His mathematics
10:35-11:20	Lecture on the work of the Chern Prize winner
11:20-11:45	**Coffee Break**
11:45-12:30	Lecture on the work of the Gauss Prize winner
12:30-13:45	**Lunch**
13:45-14:45	Special Lecture by a Fields Medallist (1) Hall 4
15:00-18:00	Invited Lectures, Panel Discussion and Short Communications in Parallel Sessions Hall 4
18:00-19:30	**Dance Performance**
20:00	**Conference Dinner**

Re-proof

Someone asked David Kazhdan enthusiastically whether a certain statement was true. Kazhdan replied promptly, ``yes, it is true. Only someone has to prove it."

From the Horse's Mouth?

Niels Bohr is supposed to have hung a horseshoe outside his door. When someone asked him whether he believed it brought forth good luck, he replied, ``I don't believe in it but apparently it works even if you don't believe in it."

Disquisitiones Arithmeticae

Such was his admiration of Karl Friedrich Gauss that the German mathematician Peter Dirichlet is said to have slept with Gauss's Disquisitiones Arithmeticae under his pillow. The admiration was mutual: "The total number of Dirichlet's publications is not large," Gauss once remarked. "Jewels are not weighed on a grocery scale."

Announcement

The electronic version of the Daily News Bulletin, *Reflexions*, will be available at the ICM 2010 website:

http://www.icm2010.org.in

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