

ICM 2010 in Hyderabad

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From 19 to 27 August 2010, approximately 3000 mathematicians gathered for the quadrennial apotheosis of mathematical celebration which is the International Congress of Mathematicians (ICM). There is indeed a feeling of the fiesta about ICM, accompanied by an underlying urgency to communicate the outcomes of years of serious thought and development that has led each of the hundreds of speakers to the honour of being chosen to talk at this event.

At times, all of us must question the usefulness of huge meetings of this kind. It is certainly a completely different experience from a specialist conference with 50-100 delegates, where everyone gets to talk to everyone else; at ICM, it can be impossible to locate someone whom one wants to meet. On Saturday alone there were four plenary one-hour lectures, followed by 26 invited lectures (in eight parallel sessions) and then 77 short communications—and 132 poster sessions! This goes on for nine days. Obviously one can only take in a small fraction of the detail, yet one comes away from it with a renewed vision of what is happening across the vast spectrum of mathematics.



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The obvious centrepiece is the award of the Fields Medals; it was great to see the President of India, diminutive of stature but great of vision, awarding these to Elon Lindenstrauss, Cédric Villani, Ngô Bao Châu and Stanislav Smirnov. Her speech emphasised the contributions of mathematics to society, and the long contributions of India to the subject. It was beautifully crafted and showed an appreciation for the mathematical sciences that one sometimes feels is lacking in other national leaders. She also awarded prizes for lifetime achievements: the Gauss Prize to Yves

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Meyer, the Chern Medal Award to Louis Nirenberg and the Nevanlinna Prize to Daniel Spielman.

Each medallist spoke on their own work, and in addition, there was a separate laudation from a distinguished member of the mathematical community. The talks of the medallists inspired us all. The Fields Medallists are young men (when will we be able to write 'men and women'?), at the height of their mathematical powers, having their substantial contributions recognised. Certainly Ngô's fundamental lemma is a major leap forward in what may be termed the p -adic Langlands problem, and is firmly in traditional Fields Medal territory. As an ergodic theorist myself, it was wonderful for me to see Lindenstrauss' profound work on rigidity recognised, particularly since it is likely to impact on applications. Smirnov's new approaches to percolation theory led to proofs of spectacular new results on the Ising model of statistical mechanics, and Villani has revolutionised work on the many-body problem, expanding ideas related to entropy. I sense that the awards are shifting somewhat in the directions of physical applications; this may be a movement within all of mathematics as the traditional pure/applied/statistics boundaries break down.

The standard of exposition was high across the entire congress, and some of the invited lectures were truly spectacular. The Abel lecture, on Large Deviations, was given by S.R.S. Varadhan. It was great to see this given by a statistician and the lecture was inspiring. Other great talks I attended were by Richard Bryant on the work of S.S. Chern, Irit Dinur on probabilistically checkable proofs and codes, Carlos Kenig on the global behaviour of solutions to nonlinear dispersive equations, David Aldous on exchangeability, A.N. Parshin on representations of higher adelic groups, Nicolai Reshetikhin on the mathematics of quantum field theory, Hillel Furstenberg on non-conventional ergodic theorems and Richard Schoen on Riemannian manifolds of positive curvature; a veritable feast of offerings.

I have nothing but praise for those involved in the organisation of the Congress. The logistical problems of getting so many thousands of people to the congress each day (there was not enough room for 3000 in the conference venue, so we were staying in a plethora of other hotels) must have been a nightmare. This was compounded by security checks (particularly when the President was there), catering and the general chaos which is Indian life. Yet we all got where we had to go more-or-less on time. There were a couple of specialist sessions where there was standing room only in the talk, but this was met with good humour.

Hyderabad is an interesting city, at least 500 years old, with unusual interesting monuments, markets and bazaars. If one is in with the right crowd at ICM there are soirees to attend and enjoy. I was fortunate enough to be invited to the Korean soiree, although perhaps the food was best at the French reception! The Koreans are completely overjoyed about the prospect of running the next ICM in Seoul in 2014.

I came back to Australia with several thoughts. Firstly, it is clear that there is good and highly recognised mathematics going on here. Today, in contrast to 30 years ago, Australia is very much on the map for itinerant mathematicians. Secondly, I felt that what we are doing aligns pretty well with international themes, although

there are obvious gaps, or whole areas represented by just one or two people in the country. Lastly, I feel that we are slightly out of the loop— whilst individuals have a grasp of what is happening in their own area, I am not sure that we have, or are striving for, a national unbiased view of the whole landscape of this wonderful subject that we study. This is perhaps not entirely true of the whole community. It is good news that Cheryl Praeger has been re-elected to the governing committee of the IMU and I am impressed that Peter Hall served on the Committee for the Fields Medal.

A couple of possible ways of increasing our influence internationally, as a country, were discussed. Australia could upgrade its membership of the IMU, giving it four or five votes as against the three it has at present (many countries have only one or two votes); this would require a larger subscription. Or, we could make a bid to host a future ICM. Realistically, this would mean bidding to host the 2022 ICM, though we may wish to put in a preliminary bid for 2018 as a trial. The path to hosting a successful ICM is hard, but rewarding. One really has to start with external funding of around three million dollars. The result would be an incredible boost for Australian mathematics.

These reflections serve only to remind us what a great job the Indian community has done in Hyderabad. M.S. Raghunathan and his team deserve congratulations from all of us.

I am sure that Seoul will be a great ICM in 2014, and recommend that members of the Society begin planning to attend.