

The Fields Medals will be awarded this year in August at the International Congress of Mathematicians ICM2006 in Madrid

## **The Mathematical Community Awaits a Verdict on Poincaré's Conjecture, this summer at the ICM2006**

About 5,000 mathematicians from all over the world are due to attend the International Congress of Mathematicians ICM2006, to be held this August in Madrid, Spain (22-30 August). The ICM is the most important meeting of the International Mathematical Union (IMU) and has taken place every four years for almost a century. It is considered the greatest mathematical event in the world, where the most important advances are presented. Among the most eagerly awaited news this time will be a 'verdict' on the solution to one of the most burning mathematical questions of the time, Poincaré's Conjecture.

With a budget of three million euros, the ICM is also where the most outstanding mathematicians of the last four years receive their awards: the **Fields Medals**, considered to be the **Nobel Prize for Mathematics**; the **Nevanlinna Prize**; and the **Gauss Prize**. It is hoped that the Fields Medals will be presented during the ICM2006 opening ceremony (22 August) by King Juan Carlos. The Nevanlinna Prize is awarded for advances in mathematical aspects of information science, and the Gauss Prize will be conferred for the first time this year, for mathematical advances that have had the greatest impact on technological development and daily life.

The scientific programme of the ICM2006 has been carefully drawn up by a Scientific Committee of about a dozen members, whose names are not made public until the Congress is over. Throughout the week of the Congress 20 plenary lectures and 169 invited lectures will be held, covering all mathematical fields. In addition, more than 60 parallel satellite conferences will take place in other Spanish cities (Zaragoza, Sevilla, Barcelona, etc.) and abroad.

### **Will one of the 'Millenium Problems' be solved?**

Among the most awaited lectures will be those given by the leading experts on the **solution of the Poincaré Conjecture**, posed a few years ago by the Russian Grigori Perelman. Since its formulation in 1904, Poincaré's Conjecture has been one of the problems that has consumed most "brain power" in mathematics, to such an extent that the issue has been referred to as "Poincaritis", a species of contagion affecting those who have spent decades in an attempt to resolve the problem. Furthermore, Poincaré's Conjecture is **one of the seven Millennium Problems**, the solution of which carries an award of **one million dollars** each from the Clay Mathematics Institute (Cambridge, Massachusetts).

In 1994 Perelman sequestered himself away to tackle the problem, and for the following eight years gave no signs of life. In May 2003 he

announced that he had managed to prove the Conjecture and posted his work –much more extensive than Poincaré’s Conjecture itself– on the Internet, for other experts to check. No one has drawn attention to any errors in Perelman’s work ever since, but the final verdict has still to be pronounced.

Although the ICM2006 is not about to issue an official statement, those who have been hard at work on Perelman’s solution are expected to present their conclusions. One of them is Richard Hamilton, who developed a tool used by Perelman to prove the Conjecture. Another expert who will be present at the ICM2006 is John Morgan, from Columbia University (USA), a renowned specialist who has also worked on the Conjecture. Morgan, together with Gang Tian, have recently published an analysis on Perelman’s work entitled “Ricci Flow and the Poincaré Conjecture”.

The attendance of these experts at the ICM2006 has recently become the object of even greater interest since the Chinese mathematicians Xi-Ping Zhu, from the University of Zhongshan (Canton, China), and Huai-Dong Cao, from Lehigh University in Pennsylvania (USA), announced in the latest issue of the *Asian Journal of Mathematics*, published in the U.S.A., that they had arrived at “a complete proof of the Poincaré and Geometrization Conjectures”. Zhu and Cao base their work –according to their abstract– “on the accumulative works of many geometric analysts in the past thirty years”, and they specifically mention Hamilton and Perelman himself.

On top of that, Bruce Kleiner and John Lott, from the University of Michigan (USA) have also published “Notes on Perelman’s papers”, described as “detailed notes” on two of Perelman’s papers.

### **IMU General Assembly**

The Congress will be preceded by the IMU General Assembly, which will be held on August 19<sup>th</sup> and 20<sup>th</sup> in Santiago de Compostela, Spain. Every four years, the IMU holds its General Assembly on the weekend preceding the ICM Congress. The member countries of the IMU, which at present number 67, get together to take decisions that will affect the future of mathematics in the world during the coming four years. The meeting is always held in the country responsible for organizing the congress, although in a different city.

### **The Three Axes of the ICM2006**

The choice of Santiago de Compostela has to do with the international connotations that every ICM Congress has. The 1998 Berlin congress paid tribute to the victims of the Holocaust, and Beijing 2002 marked a further step on China’s road to democracy and closer relations with the West. The ICM 2006 would like to highlight the unusual geopolitical situation in Spain, by setting out three major axes of procedure: the Latin American axis, which seeks to encourage participation from

mathematicians from this region; the Mediterranean axis, a revival of the Spain of the Three Cultures --symbolized by the meeting “Mathematics for Peace and Development” in Córdoba in July--; and the European axis, symbolized by the holding of the IMU General Assembly in Santiago de Compostela, with the *Camino de Santiago* or Road to Santiago as the channel for culture and science in the Middle Ages.

### **International Fractal Art Contest**

The ICM2006 also includes a busy social and cultural agenda. Among other activities, four exhibitions open to the public and an International Fractal Art Contest

(<http://www.icm2006.org/culturalactivities/fractalart/>) will take place within the framework of the ICM2006.

### **More information about the ICM2006 (including Fields Medals):**

<http://www.icm2006.org/press/dossier/>

### **Weekly News Bulletin ‘InfoICM2006’**

During the 20 weeks prior to the ICM2006 a weekly bulletin containing news, interviews and information about the ICM and its satellite conferences will be issued. Some interviewees are: Benoit Mandelbrot; Jean Pierre Serre; Efim Zelmanov; Michael Atiyah; Terence Tao; John Ball; Peter Lax; Juan Luis Vázquez; and Manuel de León. InfoICM2006 can be obtained via the congress web page [www.icm2006.org](http://www.icm2006.org), clicking on ‘Press Room’.

Also, readers can subscribe by contacting the Press Office of ICM2006:

<http://www.icm2006.org/press/contact/>

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