

ESF RESEARCH CONFERENCES

Rapporteur Report

Partnership:	ESF-ICTP
Conference Title:	Geometric Analysis
Dates:	24 June – 29 June 2012
Chair:	C. Arezzo, <i>ICTP, IT</i> ; F. Pacard, <i>Ecole Polytechnique, FR</i> ; R. Schoen, <i>Stanford, US</i> ; G. Tian, <i>Princeton, US & Beijing, CN</i>
Rapporteur:	Luc Lemaire, <i>Université Libre de Bruxelles, BE</i>

General Comments

This school/conference concerned Geometric Analysis, a mathematical field presently extremely active, with major problems recently solved by an array of new methods.

This event is part of a 40-years old series of such meetings in ICTP Trieste. The level and quality of these meetings is uniformly high, and this one ranked at the very top.

The main aim of ICTP is to support mathematicians and physicists of third world countries, and it is a sound investment to fund young European researchers as well on a regular basis.

My evaluation of this meeting is "outstanding throughout".

Quality of Scientific Programme, Presentations and Discussion

The scientific programme and the presentations were truly outstanding.

The subject of the school/conference was "Geometric Analysis", a very active domain that has witnessed spectacular progresses recently.

The event consisted of a two-week long school, followed by a one-week conference. This combination allows to first bring the participants up to the level of knowledge allowing them to benefit from the conference.

The school consisted in seven courses (from five to ten hours each), given by first class specialists.

I was particularly impressed that the organisers could attract two absolute top mathematicians to give such courses, namely Richard Schoen (Stanford) and Gang Tian (Princeton and Peking).

The conference consisted mostly of one hour lectures, but included two mini courses of three or four hours, describing recent progresses. This is quite unusual, and worked very well since the speakers could really develop the problems and methods they were addressing.

Two recent and important progresses of geometric analysis were in particular presented during the event.

In 2006, Grigory Perelman proved the Poincaré conjecture, a problem posed by Henri Poincaré in 1904. This was certainly the major mathematical event of this beginning century. His proof is an extension of a programme developed over twenty years by Richard Hamilton, the main ingredient being the so-called "Ricci flow".

The work of Hamilton and Perelman introduced a huge amount of new and subtle ideas and methods, which obviously will apply to other problems. To gain good knowledge of these methods is not an easy matter but will be an asset to any mathematician.

And indeed, three courses of the first two weeks were devoted to different aspects of the Ricci flow, a total of 17 hours.

Another recent progress is the proof in 2012 (!) of the Willmore conjecture, a problem posed in 1965.

The two mathematicians who solved this problem a few months ago, Fernando Coda Marques and Andre Neves, were among the speakers, and they gave a four-hour presentation of their methods and proof. This was preceded in the first two weeks by a six-hour introduction to the subject.

Again, the wealth of methods and fields presented will be an asset to any of the participants.

As an aside, note that the 2012 Ramanujan Prize, distinguishing the best young mathematician of developing countries, has been awarded in June to Fernando Coda Marques.

Informal Networking and Exchange; Atmosphere

The schedule allowed for a lot of informal interaction between participants.

For instance, during the second and third weeks, the lunch breaks lasted three hours, during which all participants were on the spot and in easy contact. I observed many such interactions, involving young and more senior participants. (The centre has a number of blackboards set on the terrace, and participants occupied them all during the breaks). The atmosphere was friendly and pleasant all through, and I am certain useful contacts were initiated.

Balance of Participants

The basic aim of ICTP is to contribute to the development of physics and mathematics in developing countries. It is therefore not surprising to find a broad range of nationalities of the participants.

In this conference, the balance was :

Europe : 60

USA : 13

South America : 18

Asia : 22

Africa : 11.

There were 22 speakers and 102 other participants.

These constitute for me excellent balances.

Outlook and Future Developments

The basic aim of ICTP is to help develop physics and mathematics in third world countries.

One of its tools is a series of schools/conferences where top scientists address a large audience.

In this framework, speakers and third world scientists are funded directly by ICTP.

Because of the high level of these conferences, it would be a sound investment to provide permanent means to fund young European scientists as well, e.g. in the framework of ESF or any new structure that may emerge.

Organisation and Infrastructure

The ICTP has been running mathematics conferences since 1972, and the infrastructure has expanded regularly since then.

The venue and accommodation are excellent for the purpose of these conferences.

Summary & Overall Assessment

The school/conference was totally successful.

The scientific level and the quality of the lectures were outstanding.

The participants benefited of manifold aspects:

- discovering recent results in geometric analysis
- getting in depth lectures or mini courses on major recent breakthroughs (Ricci flow and Willmore conjecture), thereby learning essential new methods
- being in close and informal contact with each other and with top level established mathematicians.

About ESF Research Conferences

The Scheme

This conference is part of the European Science Foundation's (ESF) Research Conferences Scheme. The Scheme aims to promote scientific excellence and frontier level research throughout Europe and the rest of the world. Conferences aim to provide leading scientists and other participants, including young researchers, with a platform to present their work, to discuss the most recent developments in their fields of research and to network.

Conference Format

The core activities should be based on lectures by invited speakers, who are leaders in their respective fields, followed by extensive discussion periods. An informal exchange of ideas, both inside and outside the lecture room, should be encouraged, and the number of sessions in the daily timetable should be limited in order to allow sufficient time for interaction between the participants. Time should be reserved for a 'Forward Look Plenary Discussion' about future developments in the field.

Participants can take all their meals together to encourage further contact and networking, which can be particularly beneficial to younger researchers who may be less outspoken in the formal lecture room setting. In order to gain optimum benefit from the conference, both the speakers and the participants are asked to stay for the whole duration.

Division of Tasks

The Conference Chair is responsible for ensuring the quality of the scientific programme through the selection and invitation of speakers, and through the selection of participants.

The ESF Conferences Unit is responsible for managing all the logistical aspects of the conference organisation, including the provision of an on-site secretariat.

Further information: www.esf.org/conferences