

Advanced School and Conference on Non-commutative Geometry

9 – 27 August 2004

Miramare, Trieste, Italy

The Abdus Salam International Centre for Theoretical Physics (ICTP) is organizing an **Advanced School and Conference on Non-commutative Geometry** from 9 to 27 August 2004. It will be directed by O.A. Laudal (University of Oslo, Norway), C. Procesi (Università "La Sapienza" di Roma, Italy) and M. Van den Bergh (Limburgs Universitair Centrum, Diepenbeek, Belgium).

Non-commutative Geometry is a relatively new name for a collection of central topics of Mathematics, including Operator Algebra, classical Non-commutative Algebra, and new themes in Algebraic Geometry, with strong connections to Topology, Differential Geometry, Algebraic Number Theory and Theoretical Physics.

The origin of Non-commutative Geometry as a field, is found in the work of Alain Connes from the 1980's. His work has had applications in many directions, from work on the Riemann ζ -function Conjecture, new treatment of Renormalization in Quantum Field Theory, to Manin's "Alterstrum", concerning class-field theory for real quadratic extensions.

The impact on mathematics of old and new ideas of Mathematical Physics, like Quantum Theory and String Theory, has been strong and continues to exert a massive influence on pure mathematics. Most of the resulting purely mathematical themes would today be framed by Non-commutative Geometry.

Parallel with these developments the classical Non-commutative Algebra has been extended and has adopted new tools derived from Algebraic Geometry and Homological Algebra. Several different schools are now in the process of adopting a common Geometric Framework.

The aim of this activity is to give an introduction to the main themes of Non-commutative Geometry as it is perceived today. The idea is to spend sufficient time on developing some of the basic techniques so that graduate students and young researchers will be able to apply these in their own work.

The first two weeks (9-20 August) will be organized into lecture courses of about 4 to 12 hours each, on the following topics:

First week

- *Algebraic geometry, algebraic curves (I) - Torsten Ekedahl*
- *Non-commutative algebras - Dennis Keeler*
- *Homological algebra; abelian and derived categories - Michel Van den Bergh*
- *Homology for associative rings, K-theory etc. - Christian Kassel*

Second week

- *Algebraic geometry, algebraic curves (II) - Torsten Ekedahl*
- *Derived categories in algebraic geometry - Alexei Bondal*
- *Deformation theory - Olav Arnfinn Laudal*
- *Non-commutative differential geometry, C*-algebras etc. - Thomas Schücker*
- *Computer algebra - Gerhard Pfister*

A **Conference** with renowned experts will be held during the *third week* (23-27 August). Details of the event will be available at <http://agenda.ictp.trieste.it/smr.php?1576> at the end of January 2004.

The School is intended for advanced undergraduate students, graduate students and young researchers. Participants should be familiar with the basics in commutative algebra as well as with the language of schemes.

There will be organized afternoon and evening exercise and example sessions, and some time will be spent on applying computer algebra programmes.

Mathematicians from all countries that are members of the United Nations, UNESCO or IAEA may attend the activity. As it will be conducted in English, participants must have a good working knowledge of that language. Although the main purpose of the ICTP is to help researchers from developing nations through a programme of training activities within a framework of international cooperation, students and post-doctoral scientists from developed countries are also welcome to attend.

As a rule, travel and subsistence expenses of the participants should be borne by the home institution. Every effort should be made by candidates to secure support for their fare (or at least half-fare). However, limited funds are available for some participants from and working in a developing country, and who are not more than 45 years old. There is no registration fee.

The **Application Form** is obtainable from the ICTP WWW server:

<http://agenda.ictp.trieste.it/smr.php?1576>

(which will be constantly updated) or from the activity Secretariat. It should be completed and returned before **28 February 2004** or - for applicants not requesting financial support - before **31 May 2004**, to:

Advanced School and Conference on Non-commutative Geometry
(c/o Ms. A. Bergamo, smr1576)
The Abdus Salam International Centre for Theoretical Physics
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or

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Trieste, April 2004

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Diepenbeek, Belgium

DEADLINE(S)

28 February 2004

and

31 May 2004