4rd International School and Conference

GEOQUANT

Geometry and Quantization

Institute of Mathematics of the Institute of Academia Sinica, Bejing, China

Chern Institute of Mathematics, Nankai University, Tianjin, China

4.9.2011-17.9.2011

ESF Networking Programme ITGP, Meeting 3655

Scientific Report

Summary

The 4. School/International Conference on Geometry and Quantization took place at the Institute of Mathematics of Academia Sinica, Beijing, and the Chern Institute of Mathematics, Tianjin. Leading experts participated in the activity. The school enabled young scientists to enter the scientific field.

The scientific program of the School-Conference was concentrated around the following main topics:

1. concepts of differential and complex geometry arising in quantization
2. relations between quantization and the geometry of moduli spaces
3. infinite-dimensional Kähler geometry and its relation to quantum field theory and string theory
4. algebraic aspects of quantization, in particular, infinite-dimensional Lie algebras and groups and their representations.
5. relations with modern theoretical physics.

These fields are directions of ongoing intensive mathematical research with numerous open challenging problems waiting to be taken up by researchers.

The first week of the School-Conference was a school for young scientists, while the second part was a scientific conference on the above topics. During the first part (the school), newcomers to the field got acquainted with the basics, needed to get ready to listen to the scientific talks on the subject, presented during the second part (the conference). It was an international conference. Participants and speakers from all over Europe, Russia, Japan, China, USA, Canada, and elsewhere came.

The school and conference was attended by roughly 55 participants. A follow-up School-Conference is foreseen for the year 2013 in Europe.

The **Scientific Organization Committee** consisted of Joachim Hilgert (Paderborn University, Germany), Ryoichi Kobayashi (Nagoya University, Japan), Martin Schlichenmaier (Luxembourg University, Luxembourg), Armen Sergeev (Steklov Mathematical Institute, Moscow, Russia), Oleg Sheinman (Steklov Mathematical Institute, Moscow, Russia), Tilmann Wurzbacher (University of Metz, France), Weiping Zhang (Nankai Institute of Mathematics, Tianjin, P.R.China), Xianguy Zhou (Institute of Mathematics, Academia Sinica, Beijing, P.R.China).

The **Local Organization Committee** consisted of Chengming Bai, Chern Institute of Mathematics, Tianjin, P.R. China, Chunying Li, Institute of Math, AMSS, CAS, Beijing, P.R. China, Honghai Lü, Chern Institute of Mathematics, Tianjin, P.R. China, Weiping Zhang, Chern Institute of Mathematics, Tianjin, P.R. China, Xiangyu Zhou, Institute of Math, AMSS, CAS, Beijing, P.R. China, and Martin Schlichenmaier, Luxembourg (concerning travel to China).

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The School

The school took place in the first week, i.e. from 4.9. to 10.9.2011. The program included lecture courses on the subject of the School-Conference, delivered by experts: The list of lecturers was

- **Charles, Laurent** (University Paris VI, France) *Lagrangian states in geometric quantization*
- **Gorodentsev, Alexey** (Institute of Theoretical and Experimental Physics, Moscow) A_∞ *structures and* A_∞ *coproducts of combinatorical simplicial chains*
- **Marinescu, Georg** (University of Köln, Germany) *Berezin-Toeplitz quantization and its kernel expansion*

- **Moriyoshi, Hitoshi** (Nagoya University, Japan) *Toeplitz operators, the index theorem and Connes' quantum calculus*
- **Nohara, Yuichi** (Tohoku University, Japan) *Toric degenerations of Grassmannians and integrable systems*
- **Ratiu, Tudor** (Lausanne, Switzerland) *The reduction method and applications*
- **Schlichenmaier, Martin** (University of Luxembourg, Luxembourg) *Berezin-Toeplitz quantization for compact Kähler manifolds. An introduction*
- **Sheinman, Oleg** (Steklov Mathematical Institute, Russia) *Quantization of integrable systems and 2D conformal field theory*
- **Wu, Siye** (University of Hong Kong, China) *Geometric quantization by branes*

Each speaker gave 3 lectures each lasting 1 hour.

The Scientific Conference

The Scientific Conference (11.9. – 17.9. 2011) consisted of talks of either 50 minutes or 25 minutes lengths (including discussions).

The following is a list of the talks presented at the conference:

Pierre Bieliavsky, *Universal deformation formula for non-abelian Lie group structure*

Alexander Efimov, *Quantum cluster variables via vanishing cycles*

Yael Frégier, L_∞ *algebras governing simultaneous deformations via derived brackets*

Chin-Yu Hsiao, *Bergman kernel asymptotics for big line bundles*

William Kirwin, *Adapted complex structures, magnetic complex structures and generalizations*

Alexander V. Komlov, *Local holomorphic initial value problem for integrable evolution equations*

Hiroshi Konno, *Convergence of Kähler to real polarizations on flag manifolds*

George Marinescu, *The first coefficients of the Toeplitz kernel asymptotic*

Ivailo Mladenov, *Quantum mechanics on Eulerian Elastics*

Anatol Odzijewicz, *Positive kernels and quantization*

Denis Vasilyevich Osipov, *Category central extensions and reciprocity laws on algebraic surfaces*

Roman Palvelev *Adiabatic principle in the abelian Higgs model*

Alexey Nicolaevich Parshin, *Representations of discrete adelic groups*

Roberto Paoletti, *Local trace formulae in Toeplitz quantization*

Tudor Ratiu, *Weil-Petersson geodesics on the universal Teichmüller space*

Martin Schlichenmaier, *Berezin's coherent states , symbols and transform revisited*

Armen Glebovich Sergeev, *Harmonic spheres conjecture*

Andrei Igorevich Shafarevich, *Properties of Classical Hamiltonian systems and quantum packets on graphs and singular spaces*

Yanli Song, *K-Homology and the quantization commutes with reduction problem*

Dmitry Valerievich Talalaev, *Flag varieties and integrable system*

Nikolay Andreevich Tyurin, *Chekanov tori in toric varieties*

Siye Wu, *Projectively flat bundles from quantization*

Ping Xu, *Delocalized twisted equivariant cohomology*

Takahiko Yoshida, *Equivariant local index*

Weiping Zhang, *On the Vergne conjecture of geometric quantization on noncompact manifolds*

Alexander Zheglov, *On commutative rings of partial differential operators*