Report

Geometry and Physics VIII

GAP VIII

Scalea, Italy, September 13-17, 2010

The "Séminaire Itinérant de Géométrie et Physique", also known as Geometry and Mathematical Physics (GAP), is a series of annual summer schools, which has been held around the world since 2003. Each year's program is devoted to a specific topic in the broad area of Geometry and Mathematical Physics. This years edition focused on Noncommutative Geometry. The program was made up of 4 mini-courses plus several well-chosen plenary talks by experts in the field. Special attention was made to invite quite a number of young post-docs to allow them to enter this fascinating mathematical field.

For the convenience of participants, the presentation material used in lectures will be collected and posted on the summer school's website **http://monge.u-bourgogne.fr/gdito/gap8/** for later reference.

The conference was held at the Grand Hotel de Rose in Scalea, Italy. The hotel has good meeting facilities and offered rooms for a very attractive price. All participants were lodged in this hotel. where we have booked rooms with full-board. Check-in was Sunday September 12, check-out Saturday September 18. Scalea is a village located in Calabria, Southern Italy, on the Tyrrhenian coast.

Mini-Courses

The following mini-courses (each for 3 times 1 hour) were given:

- Michel Dubois-Violette (Orsay)

  Koszul algebras

- Nigel Higson (Penn State)

  Dirac operators and K-homology

- Yasuyuki Kawahigashi (Tokyo)

  Superconformal field theory, operator algebras and noncommutative geometry

- Henri Moscovici (Ohio State University)

  Hopf algebras and transverse characteristic classes

Other speakers

- Susama Agarwala (Caltech) – *The β-function over curved space-time under ζ-function regularization*

- Pierre Bieliavsky (Université Catholique de Louvain) – *Homogeneous Kähler manifolds and locally compact quantum groups*

- Simon Brain (Radboud University Nijmegen) – *Noncommutative Geometry of Self-Dual Gauge Fields*

- Jesper Grimstrup (The Niels Bohr Institute) – *Coupling matter to quantum gravity via spectral triples*

- Masoud Khalkhali (University of Western Ontario) – *The Gauss-Bonnet theorem for the noncommutative torus*

- Vladislav Kupriyanov (Universidade de Sao Paulo) – *Star products through the Weyl ordering*

- Fedele Lizzi (Università di Napoli Federico II) – *Star-product in the presence of a monopole*

- Hessel Posthuma (University of Amsterdam) – *Hopf algebroids and cyclic cohomology*

- Harold Steinacker (University of Vienna) – *Matrix models, non-commutative geometry, and gravity*

- Aïssa Wade (Penn State) – *CR geometry, Lie bialgebroids, and applications*

- Walter Van Suijlekom (Radboud University Nijmegen) – *On the spectral action in non-commutative geometry*

Organisation Committee

Giuseppe Dito (Dijon), Giovanni Landi (Trieste), Martin Schlichenmaier (Luxembourg) *(Contact Person to the ESF research networking programme ITGP)*, Mathieu Stienon (Paris 7), Ping Xu (Luxembourg)

Support:

Beside from the ESF research networking programme ITGP, we received support from the NSF, University of Luxembourg, University of Dijon, Penn-State University, and GNSAFA/INdAM (Italy)

Participants and Program

In total we had 46 participants (including the organisers). The list of participants and the program of the conference is attached to this final scientific report.

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Participants

Name	Affiliation
Agarwala, Susama	California Institute of Technology, U.S.A.
Bahns, Dorothea	University of Göttingen, Germany
Bieliavsky, Pierre	Université Catholique de Louvain, Belgium
Brain, Simon	Radboud University Nijmegen, The Netherlands
Ciccoli, Nicola	Università di Perugia, Italy
Cirio, Lucio	University of Lisboa, Portugal
Claessens, Laurent	Belgium
Dabrowski, Ludwik	SISSA, Italy
Daenzer, Calder	UC Berkeley, U.S.A.
D'Andrea, Francesco	SISSA, Italy
De Nittis, Giuseppe	SISSA, Italy
Dito, Giuseppe	Université de Bourgogne, France
Dubois-Violette, Michel	Université Paris-Sud, France
Gayral, Victor	Universite de Reims, France
Grimstrup, Jesper	The Niels Bohr Institute, Denmark
Hasselmann, Stefan	Leibniz Universität Hannover, Germany
Higson, Nigel	The Pennsylvania State University, U.S.A.
Kawahigashi, Yasuyuki	The University of Tokyo, Japan
Khalkhali, Masoud	The University of Western Ontario, Canada
Kupriyanov, Vladislav	Universidade de São Paulo, Brazil
Landi, Giovanni	Università degli studi di Trieste, Italy
Lawn, Marie-Amélie	University of Neuchâtel, Switzerland
Li, Hanfeng	SUNY at Buffalo, U.S.A.
Lizzi, Fedele	Università di Napoli Federico II, Italy
Liu, Zhangju	Peking University, China
Maeda, Yoshiaki	Keio University, Japan
Marmo, Giuseppe	Università di Napoli Federico II, Italy
Martinetti, Pierre	Università di Roma *Tor Vergata*, Italy
McMillan, Aaron	UC Berkeley, U.S.A.
Mimura, Masato	The University of Tokyo, Japan
Moscovici, Henri	The Ohio State University, U.S.A.
Pagani, Chiara	Leibniz Universität Hannover, Germany
Posthuma, Hessel	University of Amsterdam, The Netherlands
Schlichenmaier, Martin	Université du Luxembourg, Luxembourg
Sheng, Yunhe	Jilin University, China
So, Bing Kwan	Université du Luxembourg, Luxembourg
Steinacker, Harold	University of Vienna, Austria
Sternheimer, Daniel	Université de Bourgogne, France and Keio University, Japan
Stienon, Mathieu	Université Paris 7, France
Van Suijlekom, Walter	Radboud University Nijmegen, The Netherlands
Vitale, Patrizia	Università di Napoli Federico II, Italy
Vizman, Cornelia	West University of Timisoara, Romania
Voigt, Christian	University of Münster, Germany
Wade, Aïssa	The Pennsylvania State University, U.S.A.
Xu, Ping	Université du Luxembourg, Luxembourg
Zampini, Alessandro	Max-Planck-Institut für Mathematik, Germany

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Program

Monday, September 13

9:15	9:30	Opening
9:30	10:30	**H. Moscovici** — *Hopf algebras and transverse characteristic classes (1)*
		- Coffee break -
11:00	12:00	**Y. Kawahigashi** — *Superconformal field theory, operator algebras and noncommutative geometry (1)*
		- Lunch -
17:00	17:50	**Simon Brain** — *Noncommutative Geometry of Self-Dual Gauge Fields*
17:50	18:40	**Harold Steinacker** — *Matrix models, non-commutative geometry, and gravity*
18:40	19:30	**Aïssa Wade** — *CR geometry, Lie bialgebroids, and applications*

Tuesday, September 14

9:00	10:00	**N. Higson** — *Dirac operators and K-homology (1)*
10:00	11:00	**Y. Kawahigashi** — *Superconformal field theory, operator algebras and noncommutative geometry (2)*
		- Coffee break -
11:30	12:30	**H. Moscovici** — *Hopf algebras and transverse characteristic classes (2)*
		- Lunch -
17:50	18:40	**Fedele Lizzi** — *Star-product in the presence of a monopole*
18:40	19:30	**Vladislav Kupriyanov** — *Star products through the Weyl ordering*

Wednesday, September 15

9:00	10:00	**Y. Kawahigashi** — *Superconformal field theory, operator algebras and noncommutative geometry (3)*
10:00	11:00	**M. Dubois-Violette** — *Koszul algebras (1)*
		- Coffee break -
11:30	12:30	**N. Higson** — *Dirac operators and K-homology (2)*
		- Lunch -
		- Boat excursion -

Thursday, September 16

9:00	10:00	**M. Dubois-Violette** — *Koszul algebras (2)*
10:00	11:00	**H. Moscovici** — *Hopf algebras and transverse characteristic classes (3)*
		- Coffee break -
11:30	12:30	**N. Higson** — *Dirac operators and K-homology (3)*
		- Lunch -
17:00	17:50	**Masoud Khalkhali** — *The Gauss-Bonnet theorem for the noncommutative torus*
17:50	18:40	**Pierre Bieliavsky** — *Homogeneous Kaehler manifolds and locally compact quantum groups*
18:40	19:30	**Hessel Posthuma** — *Hopf algebroids and cyclic cohomology*

Friday, September 17

9:00	9:50	**Walter van Suijlekom** — *On the spectral action in noncommutative geometry*
9:50	10:40	**Jesper Grimstrup** — *Coupling matter to quantum gravity via spectral triples*
		- Coffee break -
11:10	12:00	**Susama Agarwala** — *The β-function over curved space-time under ζ-function regularization*
12:00	13:00	**M. Dubois-Violette** — *Koszul algebras (3)*
		- Lunch -
		- Closing -

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