Conférence C o m m é m o r a t i v e Nikolai Neumaier

Gedenk-Kolloquium/Commemorative Colloquium

LMIA, Mulhouse, France

16 - 18 Juin, 2011

Preliminary program

<u>Thursday, 16th of June</u>

10h00 --------- Hartmann Römer (Freiburg, Germany)

11h10 ---- Coffee break

11h30 --------- Daniel Sternheimer (U. de Bourgogne, France, and Rikkyo Univ., Japan)

12h40 ---- Lunch

14h30 --------- Simone Gutt (Brussels/Metz, Belgium)

15h40 ---- Coffee break

16h00 --------- Didier Arnal (U. de Bourgogne, France)

17h10 --------- Blas Torrecillas (Almeria, Spain)

<u>Friday, 17th of June</u>

10h00 --------- Markus Pflaum (Boulder, USA)

11h10 ---- Coffee break

11h40 --------- Henrique Bursztyn (Rio de Janeiro, Brazil)

12:50 ---- Lunch

14h30 --------- Damien Calaque (Lyon, France)

15h40 ---- Coffee break

16h00 --------- Tudor Ratiu (Lausanne, Switzerland)

17h10 --------- Niels Kowalzig (Bures-sur-Yvette, France)

19h30 ---- Conference Dinner in the Restaurant *La tour de l'Europe*, top floor.

Saturday, 18th of June

09h00 --------- Giuseppe Dito (U. de Bourgogne, France)

10h10 ---- Coffee break

10h30 --------- Hans-Christian Herbig (Aarhus, Denmark)

11h40 --------- Stefan Waldmann (Freiburg, Germany)

Didier Arnal

Polynomial separating overgroups

Abstract: We consider the moment map for a unitary representation $(\pi, \mathcal{H})$ of a Lie group G. This map $\Psi : \mathcal{H}^\infty \setminus \{0\} \rightarrow \mathfrak{g}^\star$, introduced in the '90 by N. J. Wildberger, is defined as

$$\langle \Psi(v), X \rangle = \mathfrak{Im} \frac{(\pi'(X)v|v)}{2(v|v)}.$$

Generally, if π is irreducible, the range of Ψ is the closed convex hull of a coadjoint orbit $\mathcal{O}$ in $\mathfrak{g}^\star$.

We shall first prove that Ψ is indeed a moment map for a Hamiltonian G-action on a symplectic Fréchet manifold. It is also possible to define a Fréchet-Lie group $G \ltimes V$, such that, each G-action coming from an irreducible π can be extended to a $G \ltimes V$-action, in such a manner that this new action characterizes π.

Looking now to the question of injectivity for the map $\mathcal{O} \mapsto \overline{\text{Conv}}(\mathcal{O})$, we study the construction of a finite dimensional overgroup $G^+ = G \ltimes V$ and a polynomial map $\phi : \mathfrak{g}^\star \rightarrow \mathfrak{g}^{+\star}$ such that for generic orbits $\mathcal{O}$, $\phi(\mathcal{O})$ is a G^+-orbit and $\overline{\text{Conv}}(\phi(\mathcal{O}))$ characterizes $\mathcal{O}$. We prove such a construction exists, with degree$(\phi) \leq 2$, for any nilpotent Lie group G with $\dim(G) < 8$. But, for $G = SL(n, \mathbb{R})$, there is such a separating overgroup with degree$(\phi) = n$, and no such overgroup with degree$(\phi) \leq 2$, if $n > 2$.

Henrique Bursztyn

Morita equivalence in Poisson geometry and deformation quantization

Abstract: The talk will discuss the classification of Morita equivalent star products on Poisson manifolds (joint work with S. Waldmann and V. Dolgushev) as well as work in progress that attempts to establish a concrete link between these results and the geometric notion of Morita equivalence of Poisson manifolds, due to P. Xu.

Damien Calaque

A Lie theoretic approach to derived self-intersections

Abstract: TBA

Giuseppe Dito

Deformation quantization as a pseudo BCH formula

Abstract: TBA

Simone Gutt

Mp^c structures and symplectic Dirac operators

Abstract: The talk will present some recent results obtained jointly with Michel Cahen and John Rawnsley. Given a symplectic manifold (M, ω) admitting a metaplectic structure, and choosing a positive ω-compatible almost complex structure J and a linear connection ∇ preserving ω and J, Katharina and Lutz Habermann have constructed two Dirac operators D and $\widetilde{D}$ acting on sections of a bundle of symplectic spinors. They have shown that the commutator $[D, \widetilde{D}]$ is an elliptic operator preserving an infinite number of finite dimensional subbundles. We extend the construction of symplectic Dirac operators to any symplectic manifold, through the use of Mp^c structures. These exist on any symplectic manifold and equivalence classes are parametrized by elements in $H^2(M, \mathbb{Z})$. For any Mp^c structure, choosing J and a linear connection ∇ as before, there are two natural Dirac operators, acting on the sections of a spinor bundle, whose commutator $\mathcal{P}$ is elliptic. Using the Fock description of the spinor space allows the definition of a notion of degree and the construction of a dense family of finite dimensional subbundles; the operator $\mathcal{P}$ stabilizes the sections of each of those.

Hans-Christian Herbig

TBA

Abstract: TBA

Niels Kowalzig

Twisted Cyclic (Co)Homology of Hopf Algebroids

Abstract: The notions of Hopf algebroids and their cyclic (co)homology, Hopf-cyclic (co)homology, incorporate concepts of generalised symmetries in noncommutative geometry (i.e., the noncommutative analogue of groupoids and Lie algebroids) and their associated (co)homologies. We discuss the cyclic cohomology for left Hopf algebroids ($\times_A$-Hopf algebras) with coefficients in a right module-left comodule which is not necessarily stable anti Yetter-Drinfel'd, and explain how this fits into the monoidal category of (Hopf algebroid) modules showing that it descends in a canonical way from the cyclic cohomology of corings. A generalisation of cyclic duality that makes sense for arbitrary para-cyclic objects yields a dual homology theory. We then give a few examples of (left) Hopf algebroids such as universal enveloping algebras of Lie-Rinehart algebras (Lie algebroids), jet spaces, and convolution algebras over étale groupoids. By computing their respective cyclic theory, we establish Hopf-cyclic (co)homology as a noncommutative extension of both Lie-Rinehart (co)homology and groupoid homology. In particular, both Hochschild and Poisson (co)homology, crucial ingrdients in deformation quantisation, are covered by this theory.

Markus Pflaum

Cyclic Homology Theory of deformation quantization algebras and applications to index theory

Abstract: TBA

Tudor Ratiu

TBA

Abstract: TBA

Hartmann Römer

Why Do We See a Classical World?

Abstract: From a general abstract system theoretical perspective, a quantum-like system description in the spirit of a generalized quantum theory may appear to be simpler and more natural than a classically inspired description. We investigate the reasons why we nevertheless conceive ourselves embedded into a classically structured world.

Daniel Sternheimer

The making of deformation quantization and some of its perspectives, 40 years later

Abstract: TBA

Blas Torrecillas

Gorenstein flat modules

Abstract: We describe Gorenstein flat modules for graded rings. We study Gorenstein regular triangular matrix rings and we characterized Gorenstein flat modules over such rings.

Stefan Waldmann

Equivariant Morita equivalence of star products on symplectic manifolds

Abstract: In this talk I will report on one of the last works of Nikolai (together with Stefan Jansen, Gregor Schaumann and myself). Based on earlier results of Nikolai on the classification of invariant star products and quantum momentum maps, the classification of star products algebras up to equivariant Morita equivalence on symplectic manifolds with a symplectic Lie algebra action is obtained provided an invariant connection exists. If in addition one has a quantum momentum map then the equivariant Picard group can be computed quite explicitly.