WORKSHOP ON QUANTIZATION AND GEOMETRY
TITLES AND ABSTRACTS

Anton Alekseev, Université de Genève
Title: *Braid groups, associators and explicit solutions of the Kashiwara-Vergne conjecture*
Abstract: TBA

Yuri Berest, Cornell University
Title: *Calogero-Moser Spaces over Algebraic Curves*
Abstract: This talk will explain a geometric classification of left ideals in the ring $\mathcal{D}(X)$ of global differential operators on a complex smooth algebraic curve X. Our results generalize the classification of ideals of the first Weyl algebra; however, our methods are different. As in the Weyl algebra case, we will use our classification of ideals to describe domains Morita equivalent to $\mathcal{D}(X)$. Time permitting some generalizations will be discussed.

Alexey Bondal, University of Aberdeen
Title: *TBA*
Abstract: TBA

Damien Calaque, Université de Lyon
Title: *Duflo's isomorphism and Caldararu's conjecture*
Abstract: in the late 70s, Michel Duflo proved that one can twist the PBW isomorphism in Lie theory so that it restricts to an algebra isomorphism on invariants. There exists an analogous result for complex manifolds, stating that the HKR isomorphism can be twisted by an appropriate element so that it induces an algebra isomorphism in cohomology. The main goal of this talk is to present this result together with its homological version, known as Caldararu's conjecture. We will also try to catch a few ingredients of the proof, derived from Kontsevich's work on deformation quantization. The talk will be based on a joint work with Michel Van den Bergh, and on works in progress with Carlo Rossi and Michel Van den Bergh.

Andrei Caldararu, University of Wisconsin, Madison
Title: *Non-flat base change and the orbifold HKR isomorphism*
Abstract: I shall discuss and prove a base change theorem for derived categories of smooth schemes, in the absence of flatness assumptions. This question turns out to be closely related to that of constructing spaces of paths in topology. As an application I shall present a Hochschild-Kostant-Rosenberg isomorphism for smooth, global quotient orbifolds. I shall also discuss recent progress in understanding a spectral sequence computing spaces of open string states. (Joint work with Dima Arinkin.).

Daniel Huybrechts, Universität Bonn
Title: *Chow groups and derived categories of K3 surfaces*
Abstract: I will report on recent results about the group of autoequivalences of the derived category of coherent sheaves on a K3 surface and some consequences for Chow groups of such surfaces.

Dmitry Kaledin, Independent University of Moscow
Title: *Deformation quantization in positive characteristic*
Abstract: TBA

Sergey Khoroshkin, ITEP Moscow

Title: *Harish-Chandra isomorphism and representations of Yangians*

Abstract: We have a description of centralizers of reductive Lie groups as of polynomial invariants for a certain rational action of the Weyl group. This is used for a precise description of irreducible representations of twisted Yangians.

Manfred Lehn, Universität Mainz

Title: *On symplectic singularities*

Abstract: TBA

Sergei Merkulov, Stockholm University

Title: *de Rham field theories on configuration spaces and the Grothendieck-Teichmüller group*

Abstract: We discuss a de Rham field theory on a compactified (braid) configuration space of pairwise distinct points in the hyperbolic n-space, and use it to construct exotic automorphisms of some geometric and algebraic structures such as Schouten's **prop** of polyvector fields (n=2) and Drinfeld's **prop** of quasi Lie bialgebras (n=3). The theory depends on the choice of a Kontsevich-type propagator, a certain differential $n-1$-form on the n-dimensional hyperbolic space.

Hessel Posthuma, University of Amsterdam

Title: *Deformation quantization on orbifolds and index theory*

Abstract: In this talk I will review joint work with M. Pflaum (Colorado) and X. Tang (St. Louis) on deformation quantization and index theory on orbifolds. First I will discuss formal deformation quantization on certain étale groupoids and set up the index problem using cyclic cohomology. After that, I will discuss analytic applications.

Ajay Ramadoss, Cornell University

Title: *A Hochschild cocycle and a Lefschetz number theorem for differential operators*

Abstract: Let X be a compact, complex manifold and let E be a holomorphic vector bundle on X. Let $\mathrm{Diff}^\bullet(E)$ be the Dolbeault resolution of the sheaf of holomorphic differential operators on E. A construction due to Feigin et. al. gives a linear functional on the 0-th Hochschild homology of $\mathrm{Diff}^\bullet(E)$. This functional "extends" to a linear functional on the "completed" 0-th Hochschild homology of $\mathrm{Diff}^\bullet(E)$, thereby giving a linear functional I_E on the top cohomology $\mathrm{H}^{2n}(X,\mathbb{C})$ of X with complex coefficients. The main result is that I_E is just integration over X. As a consequence, one obtains a Lefschetz number formula for a global holomorphic differential operator on E.

Pierre Schapira, Université Paris VI

Title: *Hochschild class for* DQ*-modules*

Abstract: A DQ-algebroid on a complex manifold X is a $\mathbb{C}[[\hbar]]$-algebroid locally isomorphic to an algebra $(\mathcal{O}_X[[\hbar]],\star)$, where $\star$ is a star-product. We generalize to this framework several classical notions and results of commutative geometry. In particular, we construct the Hochschild homology of a DQ-algebroid, the Hochschild class of a coherent DQ-module and prove that the Fourier-Mukai transform (composition of kernels) commutes with the composition of the Hochschild classes. When the Poisson structure is symplectic, one recovers the functoriality of the Euler class of $\mathcal{D}$-modules. (Joint work with M. Kashiwara.)

Boris Shoikhet, Université du Luxembourg

Title: *A construction of* 3*-algebra structure on the Gerstenhaber-Schack cohomology of an associative bialgebra*

Abstract: The first main claim of the talk is: suppose one has an abelian n-fold monoidal category with common unit object A, satisfying some mild conditions; then $\mathrm{Ext}(A,A)$ in this category is an $n+1$-algebra. We define the category of tetramodules over an associative bialgebra; it has enough injectives. We show that it possesses naturally a 2-fold monoidal structure. Thus, the Gerstenhaber-Schack cohomology admits a 3-algebra structure.

Dmitry Tamarkin, Northwestern University

Title: *A microlocal non-displaceability criterion*

Abstract: Two compact subsets of a symplectic manifold M are called non-displaceable if one cannot move one of them from the other by any compactly supported Hamiltonian symplectomorphism. Using the notion of microsupport of a constructible sheaf, I will formulate a sufficient condition for non-dispaceability in the case $M = \mathrm{T}^*X$. It will be explained that this criterion is also applicable to more general symplectic manifolds (not necessarily T^*X), in particular to the clifford torus and the real projective space viewed as subsets of the complex projective space.

Xiang Tang, Washington University of St. Louis

Title: *Relative index of CR structures*

Abstract: We discuss a new proof of the Atiyah-Weinstein conjecture on the index of Fourier integral operators and the relative index of CR structures. This talk is based on a recent joint work with Boutet de Monvel, Leichtnam, and Weinstein.

Alexander Veselov, Loughborough University

Title: *Calogero-Moser operators and ideals in the algebra of symmetric functions*

Abstract: A differential operator can be restricted onto a subvariety if the corresponding ideal is invariant under this operator (which is quite rare, of course). I will talk about some interesting examples of this phenomenon, coming from the theory of quantum integrable systems of Calogero-Moser type.

Ping Xu, Penn State University

Title: *Extended Poisson structures on complex manifolds*

Abstract: We study extended Poisson structures on a complex manifold extending the ususal holomorphic Poisson structures. We investigate the cohomology and homology theory of extended Poisson structures. (Joint work with Chen and Stienon.)

Amnon Yekutieli, Ben Gurion University

Title: *Twisted Deformation Quantization of Algebraic Varieties*

Abstract: Let X be a smooth algebraic variety over a field of characteristic 0, endowed with a Poisson bracket. A quantization of this Poisson bracket is a formal associative deformation of the structure sheaf $\mathcal{O}_X$, which realizes the Poisson bracket as its first order commutator. More generally one can consider Poisson deformations of $\mathcal{O}_X$ and their quantizations. I will explain what these deformations are. Then I will state a theorem asserting that, when X is affine, there is a canonical quantization map (up to gauge equivalence). This is an algebro-geometric analogue of the celebrated result of Kontsevich (which deals with differentiable manifolds). In the second half of the lecture I will talk about twisted Poisson deformations, and twisted associative deformations (aka stacks of algebroids). We recently proved that there is a canonical twisted quantization map, and I will describe this result. I will end with a question regarding twisted quantization of symplectic Poisson brackets. (Some of this work is joint with F. Leitner.)