

A DAY IN THE LIFE OF π

Dipartimento di Matematica e Informatica
27 March 2018, room B3

Scientific Aim

The aim of this one day workshop is to discuss topics connected to the emergence of geometrical structures, namely Poisson and symplectic ones, underlying various aspects of quantization procedures and non commutative geometry (in a broad sense).

All seminars will be held in room B3 and will last 50 minutes, approximately. Participants are warmly welcomed to join for lunch together at the local cafeteria

Interested in participating? Contact:
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Speakers

- Paolo Antonini
- Francesco Bonechi
- Fabio Gavarini
- Niels Kowalzig
- Albert Sheu

Talk-Schedule

- 10.30 N. Kowalzig, *Higher brackets on cyclic and negative cyclic (co)homology*: In this talk, we will embed the string topology bracket developed by Chas-Sullivan and Menichi on negative cyclic cohomology groups as well as the dual bracket found by de Thanhoffer de Voelcsey-Van den Bergh on negative cyclic homology groups into the global picture of a noncommutative differential (or Cartan) calculus up to homotopy on the (co)cyclic bicomplex in general, in case a certain Poincaré duality is given. For negative cyclic cohomology, this in particular leads to a Batalin-Vilkovisky algebra structure on the underlying Hochschild cohomology. In the special case in which this BV bracket vanishes, one obtains an e_3 -algebra structure on Hochschild cohomology. The results are given in the general and unifying setting of (opposite) cyclic modules over (cyclic) operads.
- 11.30 A. Sheu, *Vector Bundles over Sphere-related Quantum Spaces*: With a C^* -algebra A viewed as the function algebra $C(X_q)$ of a “virtual” quantum space X_q in noncommutative geometry, finitely generated projective modules (f.g.p.m.) over A , or equivalently, projections in the matrix algebra $M_\infty(A)$, are the appropriate objects viewed as vector bundles over X_q . As in the classical (topological) theory, classification of vector bundles over X_q or f.g.p.m. over $C(X_q)$ up to isomorphism is a difficult problem, involving the computation of the K_0 -group $K^0(X_q) \equiv K_0(C(X_q))$ whose positive cone classifies them up to the weaker stable isomorphism. As spheres are the most fundamental nontrivial topological spaces, various versions of quantum spheres and some variants are among the most popular quantum spaces with their K -groups already computed. So it is a natural next step to study the classification problem of vector bundles over them. In this talk, we gather some answers to this problem for some sphere-related quantum spaces, including the quantum teardrop, the quantum spheres, and the quantum complex projective spaces. In particular, some prominent known quantum line bundles arising from quantum principal $U(1)$ -bundles are explicitly identified as concrete projections.
- 14.30 F. Gavarini, *Deformations of quantum groups, their semiclassical limits and specializations at roots of 1*: (joint with Gaston Andres Garcia)
- 15.30 F. Bonechi, *Shifted Poisson structures on differentiable stacks*: The purpose of this paper is to investigate shifted (+1) Poisson structures in context of differential geometry. The relevant notion is shifted (+1) Poisson structures on differentiable stacks. More precisely, we develop the notion of Morita equivalence of quasi-Poisson groupoids. Thus isomorphism classes of (+1) Poisson stack correspond to Morita equivalence classes of quasi-Poisson groupoids. (joint with Nicola Ciccoli, Camille Laurent-Gengoux and Ping Xu)
- 16.30 P. Antonini, *Kasparov theory with real coefficients and secondary invariants*: The KK-theory groups with real coefficients can be useful tools to encode certain properties of discrete group actions on C^* algebras. The commutative instance concerns the study of elliptic operators on normal coverings of manifolds. Indeed a classical construction by Atiyah, Patodi and Singer associates a secondary invariant to an elliptic operator and to a unitary representation of the fundamental group of the ambient manifold. Using the real KK-classes associated to traces on C^* algebras, one can rephrase Atiyah’s L^2 index theorem for coverings and generalise it to a property of group actions on C^* -algebras, which can be called free and properness in K-theory. In case of such free and proper actions secondary classes can be constructed in this broader setting. (joint with Sara Azzali and Georges Skandalis)