Titles and Abstracts

Alexander BERGLUND (University of Stockholm)

TITLE: *Poincaré duality fibrations and graph complexes*

ABSTRACT: I will talk about certain higher algebraic structure, governed by Kontsevich's Lie graph complex, that can be associated to an oriented fibration with Poincaré duality fiber. To obtain it, we prove a parametrized version of the classical result, due to Kadeishvili and Stasheff, that the cohomology of a Poincaré duality space carries a cyclic C-infinity algebra structure. I will also discuss how this higher structure can be used to relate seemingly disparate problems in commutative algebra and differential topology: on one hand, the problem of putting multiplicative structures on minimal free resolutions and, on the other hand, the question of whether a given Poincaré duality fibration can be promoted to a smooth manifold bundle.

Basile CORON (Queen Mary University of London)

TITLE: *Operads and Kazhdan–Lusztig–Stanley theory*

ABSTRACT: We define a new type of global algebraic structure, axiomatically similar to an operad, with operadic products governed by chains in geometric lattices. We then use this new structure to categorify P-kernels and Kazhdan–Lusztig–Stanley polynomials of geometric lattices/matroids.

Berenice DELCROIX-OGER (Université de Montpellier)

TITLE: *From partition posets to operadic poset species*

ABSTRACT. The action of the symmetric group on the partition poset was first calculated in the 1980s. Several researchers noted its connection with the action of the symmetric group on the vector space underlying the Lie operad. This link was only conjectural until Fresse gave a chain-complex isomorphism between the order complex of the poset and the operadic levelled bar construction in 2002. Vallette soon extended this result to a new family of posets, called decorated partition posets. Chapoton noticed almost at the same time that such a phenomenon also occurred for hypertree posets, but no algebraic explanation was found. We introduce here a condition for a family of posets to have an operad structure on its cohomology and call them "species of operad posets". We will introduce this notion and give examples to illustrate it. This is work in progress, in collaboration with Clément Dupont (IMAG).

Coline EMPRIN (Université Sorbonne Paris Nord, ENS Paris)

TITLE: *Kaledin classes and formality criteria*

ABSTRACT: A differential graded algebraic structure A (e.g. an associative algebra, a Lie algebra, an operad, etc.) is formal if it is related to its homology H(A) by a zig-zag of quasi-isomorphisms preserving the algebraic structure. Kaledin classes were introduced as an obstruction theory fully characterizing the formality of associative algebras over a characteristic zero field. In this talk, I will present a generalization of Kaledin classes to any coefficients ring, to other algebraic structures (encoded by operads, possibly colored, or by properads), and to address a more general problem: the existence of homotopy equivalences between algebraic structures. I will prove new formality criteria based on this obstruction theory,

presenting applications in several domains such as algebraic geometry and representation theory.

Chiara ESPOSITO (University of Salerno)

TITLE: *Equivariant formality and reduction*

ABSTRACT: In this talk, we discuss the reduction-quantization diagram in terms of formality. First, we propose a reduction scheme for multivector fields and multidifferential operators, phrased in terms of L-infinity morphisms. This requires the introduction of equivariant multivector fields and equivariant multidifferential operator complexes, which encode the information of the Hamiltonian action, i.e., a G-invariant Poisson structure allowing for a momentum map. As a second step, we discuss an equivariant version of the formality theorem, conjectured by Tsygan and recently solved in a joint work with Nest, Schnitzer, and Tsygan. This result has immediate consequences in deformation quantization, since it allows for obtaining a quantum moment map from a classical momentum map with respect to a G-invariant Poisson structure.

Bernhard KELLER (Université Paris Cité)

TITLE: *Triples of flags categorified*

ABSTRACT: Cluster varieties of triples of flags (associated with a semi-simple group) play a key role in higher Teichmuller theory as developed by Fock-Goncharov, Goncharov-Shen and others. Indeed, in this theory, one constructs a Teichmüller cluster variety associated with the datum of a triangulated surface and a given group by gluing cluster varieties of triples of flags which are associated with the triangles. Goncharov-Shen construct the cluster structure for triples of flags using a case-by-case analysis according to the given group. In his ongoing thesis, Miantao Liu provides an alternative uniform construction which moreover yields a categorification for the corresponding cluster algebra. We will report on his work.

Florian NAEF (Trinity College Dublin)

TITLE: *Simple homotopy types in string topology*

ABSTRACT: Reidemeister and Whitehead gave a completely algebraic description of finite CW complexes up to cell collapses (aka simple homotopy types). We will see how a weakening of this structure (namely its trace) enters into the construction of an operation on the homology of the free loop space (the loop coproduct). We will also see various ways how to encode and extract such a "trace"-simple homotopy type, one of which is closely related to the notion of a homotopy Frobenius algebra. This is joint work with Pavel Safronov.

Joost NUITEN (Université de Toulouse)

TITLE: *The infinitesimal tangle hypothesis*

ABSTRACT: The tangle hypothesis is a variant of the cobordism hypothesis that considers cobordisms embedded in some finite-dimensional Euclidean space (together with framings). Such tangles of codimension d can be organized into an E_d-monoidal n-category, where n is the maximal dimension of the tangles. The tangle hypothesis then asserts that this category of tangles is the free E_d-monoidal n-category with duals generated by a single object. In this talk, based on joint work in progress with Yonatan Harpaz, I will describe an infinitesimal version of the tangle hypothesis: instead of showing that the E_d-monoidal category of tangles is freely generated by an object, we show that its cotangent complex is free of rank 1. This provides support for the tangle hypothesis (of which it is a direct consequence), but can also

be used to reduce the tangle hypothesis to a statement at the level of E_d-monoidal (n+1, n)-categories by means of obstruction theory.

Dan PETERSEN (University of Stockholm)

TITLE: *Stable homology of braid groups with symplectic coefficients*

ABSTRACT: There is a family of symplectic representations of the braid groups given by the "integral reduced Burau representation". I will explain a calculation of the stable homology of the braid groups with coefficients in this Burau representation, composed with any algebraic rational representation of the symplectic group. The answer has important consequences in analytic number theory. (Joint with Bergström-Diaconu-Westerland.)

Marcy ROBERTSON (University of Melbourne)

TITLE: *Tangles, duality and weak props*

ABSTRACT: It is well-known that tangle invariants not only capture essential information about the topological properties of tangles, but are closely related to important problems in quantum algebra. These connections often arise by treating tangle families as props and aligning tangle invariants with isomorphisms of (completed) props.

We make the observation that many of the props associated with tangles are actually props associated to cyclic operads. This observation simplifies complex constructions and enables the extension of topological techniques to address algebraic problems which are best phrased in the framework of weak, or homotopical, props. This talk will include parts of joint work with Chris Rogers, Chandan Singh and Kurt Stoeckl.

Victor ROCA I LUCIO (École Polytechnique Fédérale de Lausanne)

TITLE: *Higher Lie theory in positive characteristic*

ABSTRACT: Given a nilpotent Lie algebra over a characteristic zero field, one can construct a group in a universal way via the Baker-Campbell-Hausdorff formula. This integration procedure admits generalizations to dg Lie or L_∞-algebras, giving in general ∞-groupoid of deformations that it encodes, as by the Lurie–Pridham correspondence, infinitesimal deformation problems are equivalent to dg Lie algebras. The recent work of Brantner–Mathew establishes a correspondence between infinitesimal deformation problems and partition Lie algebras over a positive characteristic field. In this talk, I will explain how to construct an analogue of the integration functor for certain point-set models of (spectral) partition Lie algebras, and how this integration functor can recover the associated deformation problem under some assumptions. Furthermore, I will discuss some applications of these constructions to unstable p-adic homotopy theory.

Sergey SHADRIN (University of Amsterdam)

TITLE: *The Givental–Grothendieck–Teichmueller group*

ABSTRACT: I'll review the definition and the meaning of the group mentioned in the title that acts naturally on homotopy cohomological field theories (an algebraic framework for still to be defined chain level Gromov-Witten theories). In he second part of the talk I plan to focus on interesting open questions in this area.

Andrea SOLOTAR (University of Buenos Aires, Guangdong Technion)

TITLE: *Hochschild cohomology ring of triangular monomial algebras*

ABSTRACT: The cup product endows the Hochschild cohomology $HH^*(A)$ of an associative algebra A over a field k with a structure of graded commutative algebra. The description of this ring can be studied once the graded vector space $HH^*(A)$ is known. There are several examples of algebras for which this ring is completely characterized . Amongst them, for triangular string algebras, quadratic string algebras, Fibonacci algebras it is known to be trivial in positive degrees. We prove that the same result holds for triangular monomial algebras. This is a result obtained in collaboration with Dalia Artenstein, Janina Letz and Amrei Oswald.

Anna SOPENA (University of Barcelona)

TITLE: *Pluripotential Operadic Calculus*

ABSTRACT: For complex manifolds, there exists a refined notion of weak equivalence related to both Dolbeault and anti-Dolbeault cohomology. This class of weak equivalences naturally defines a stronger formality notion. In particular, satisfying the ddbar-Lemma property does not imply formality in this new sense. The goal of this talk is to introduce a novel operadic framework designed to understand this homotopical situation. Namely, I will present pluripotential A-infinity algebras as well as a homotopy transfer theorem based on this strong notion of weak equivalence.

Christine VESPA (Aix-Marseille Université)

TITLE: *On analytic exponential functors on free groups*

ABSTRACT: Functors on the category gr of finitely generated free groups and group homomorphisms appear naturally in different contexts of topology. For example, Hochschild-Pirashvili homology for a wedge of circles or Jacobi diagrams in handlebodies give rise to interesting functors on gr. Some of these natural examples satisfy further properties: they are analytic and/or exponential. Pirashvili proves that the category of exponential contravariant functors from gr to the category k-Mod of k-modules is equivalent to the category of cocommutative Hopf algebras over k. Powell proves an equivalence between the category of analytic contravariant functors from gr to k-Mod, and the category of linear functors on the linear PROP associated to the Lie operad when k is a field of characteristic 0. In this talk, after explaining these two equivalences of categories, I will explain how they interact with each other. (This is a joint work with Minkyu Kim.)

Ben WARD (Bowling Green State University)

TITLE: *Graph homology classes via hyperoctahedral symmetries*

ABSTRACT: I will discuss ongoing work to identify non-trivial classes in graph homology by combining higher homology operations with the representation theory of hyperoctahedral groups.