

Rencontre 2024 de Topologie algébrique (Réseau Thématique)

Rapport sur les contributions

ID de Contribution: 1

Type: **Non spécifié**

Little disks and tangential basepoints: an invitation to logarithmic geometry

mardi 22 octobre 2024 10:15 (55 minutes)

Various maps arising in topology look like they should come from algebraic geometry, if only one could allow them to take values « at infinity ». This is the case for the little disks operad, whose underlying spaces have the homotopy type of the configuration spaces of points on the affine line, but whose operadic maps are not algebraic in any obvious way. I will explain how to solve this problem, thereby realizing Beilinson's strategy of a « purely algebraic » proof of the formality of little disks, using logarithmic geometry. Perhaps surprisingly, one needs a non-standard notion of morphism in logarithmic geometry, dubbed « virtual morphism » by Howell. That notion also allows to realize Deligne's tangential basepoints, which are crucial in Grothendieck—Teichmüller theory, as points in the categorical sense. This is joint work with Erik Panzer and Brent Pym.

Orateur: DUPONT, Clément (Université de Montpellier)

ID de Contribution: 2

Type: **Non spécifié**

Isomonodromic deformations of irregular connections and wild mapping class groups

mardi 22 octobre 2024 14:30 (55 minutes)

Via the Riemann-Hilbert correspondence, character varieties can be seen as moduli spaces of monodromy data of meromorphic connections with regular singularities on a Riemann surface. Varying the curve with marked points, this leads to isomonodromic deformations and to the well-known mapping class group actions on character varieties.

This story admits a far-reaching generalization if we do not restrict to regular singularities: we now have to consider moduli spaces of generalized monodromy data, giving rise to wild character varieties. There are then new deformation parameters: the irregular types of the connections at their singularities.

We will discuss some recent work, in collaboration with P. Boalch, G. Rembado, and M. Tamiozzo, where we define and study the spaces of these deformation parameters and their fundamental groups, yielding wild mapping class groups. They act on the wild character varieties by Poisson automorphisms, opening the door to many questions about these wild dynamics.

Orateur: DOUÇOT, Jean

ID de Contribution: 3

Type: **Non spécifié**

Mini-cours - Free and equal higher categories

mardi 22 octobre 2024 11:15 (1h 15m)

The main objective of this series is to discuss the relationship of strict and (various variants of) weak higher categories. The beginning is the case of usual categories being embedded into $(\infty, 1)$ -categories. We will discuss this embedding in different models for $(\infty, 1)$ -categories, alongside with a reminder on these models. Once the case $n = 1$ is somewhat understood, we will move on to a similar analysis for $n = 2$. For $n > 2$, the situation is much more open, and I will describe the state of art there.

Orateur: OZORNOVA, Viktoriya

ID de Contribution: 4

Type: **Non spécifié**

Equivariant free loop spaces and equivariant algebraic K-theory

mardi 22 octobre 2024 15:30 (55 minutes)

I will give an introduction to topological Hochschild homology via free loop spaces and configuration spaces, and talk about its relationship with algebraic K-theory. I will then discuss what happens in the presence of a finite group action. This will touch upon joint work with Adamyk, Gerhardt, Hess, and Kong, and joint work in progress with Chan and Gerhardt.

Orateur: KLANG, Inbar

ID de Contribution: 5

Type: **Non spécifié**

Corecognition for iterated suspensions

mardi 22 octobre 2024 16:45 (55 minutes)

In this talk, I will present joint work with José Moreno-Fernández and Felix Wierstra on coalgebras in topological spaces. We will construct the comonad associated to a topological operad and we will sketch the proof of a recognition principle for iterated suspensions as coalgebras over the little cubes operad. These statements are Eckmann-Hilton dual to May's foundational results on iterated loop spaces. Afterwards we shall discuss some applications to homotopy operations.

Orateur: FLYNN CONNOLLY, Oisín

ID de Contribution: 6

Type: **Non spécifié**

Complete (curved) Lie algebras as models of spaces

mercredi 23 octobre 2024 09:00 (55 minutes)

The rational homotopy type of simply connected spaces is fully captured by its Quillen model, a differential graded Lie algebra constructed from the space. Conversely, any positively graded differential Lie algebra can be “realized” as a topological space, with rational homotopical and homological invariants preserved by these two functors.

However, these constructions are inherently limited to connected and simply connected spaces. To remove these constraints, we must move to the category of complete Lie algebras. Within this category, there exists a cosimplicial object that gives rise to a pair of adjoint functors between the categories of complete Lie algebras and topological spaces.

In this talk, we will explore the construction of this pair of functors and some important properties. Concretely, we will show that composing both of them results in the Bousfield-Kan \mathbb{Q} -completion. Additionally, we will discuss how this framework can be extended to curved Lie algebras, leading to a “base pointless” theory.

Orateur: FUENTES, Mario

ID de Contribution: 7

Type: **Non spécifié**

An example of twisted bialgebras of finite topological quandles

mercredi 23 octobre 2024 10:00 (55 minutes)

In this presentation, I will discuss the classification method for finite topological quandles for a given cardinality n . As an application, we classify finite topological quandles with up to 4 elements. Then in a second step, I will talk about twisted bialgebra structures within the realm of finite topological quandle species, one of the first kind and one of the second kind. The obstruction for the structure to match the double twisted bialgebra axioms is explicitly described.

These findings are the result of collaboration with Dominique Manchon.

Orateur: AYADI, Mohamed

ID de Contribution: 8

Type: **Non spécifié**

Motivic stable cohomotopy and unimodular rows

mercredi 23 octobre 2024 14:30 (55 minutes)

Unimodular rows are fundamental objects in algebraic K-theory as they classify stably free projective modules. Geometrically, they correspond to morphisms to punctured affine space and may thus be thought of as an algebro-geometric analogue of maps to spheres in topology. The latter give rise to Borsuk's cohomotopy groups, a counterpart to which was constructed purely algebraically by van der Kallen in the 1980s using certain orbit sets of unimodular rows. Nowadays, using the homotopy theory of schemes, Borsuk's construction may be followed more directly to produce the motivic cohomotopy groups of Asok and Fasel. We prove that these two approaches of "algebraic" cohomotopy, namely van der Kallen's and Asok–Fasel's, coincide in that there is a natural map from orbit sets of unimodular rows to motivic cohomotopy groups which is a group isomorphism in the dimension range where both structures exist.

Orateur: LERBET, Samuel (Institut Fourier, Université Grenoble Alpes)

ID de Contribution: 9

Type: **Non spécifié**

Mini-cours - Free and equal higher categories

mercredi 23 octobre 2024 11:30 (1 heure)

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Orateur: OZORNOVA, Viktoriya

ID de Contribution: 10

Type: Non spécifié

Modules of equivariant Eilenberg–MacLane spectra

mercredi 23 octobre 2024 15:30 (55 minutes)

Cohomology with \mathbb{Z}/p -coefficients is represented by a stable object, an Eilenberg–MacLane spectrum $H\mathbb{Z}/p$. Classically, since \mathbb{Z}/p is a field, any module over $H\mathbb{Z}/p$ splits as a wedge of suspensions of $H\mathbb{Z}/p$ itself. Equivariantly, cohomology and the module theory of G -equivariant Eilenberg–MacLane spectra are much more complicated.

For the cyclic group $G = C_p$ and the constant Mackey functor $\underline{\mathbb{Z}}/p$, there are infinitely many indecomposable $H\underline{\mathbb{Z}}/p$ -modules. Previous work together with Dugger and Hazel classified all indecomposable $H\underline{\mathbb{Z}}/2$ -modules for the group $G = C_2$. The isomorphism classes of indecomposables fit into just three families. By contrast, we show for $G = C_p$ with p an odd prime, the classification of indecomposable $H\underline{\mathbb{Z}}/p$ -modules is wild. This is joint work in progress with Grevstad.

Orateur: MAY, Clover

ID de Contribution: 11

Type: **Non spécifié**

Perverse homotopy heart of stable motivic homotopy and Milnor-Witt cycle modules

mercredi 23 octobre 2024 16:45 (55 minutes)

In the nineties, Voevodsky proposed a radical unification of algebraic and topological methods. The amalgam of algebraic geometry and homotopy theory that he and Fabien Morel developed is known as motivic homotopy theory. Roughly speaking, motivic homotopy theory imports methods from simplicial homotopy theory and stable homotopy theory into algebraic geometry and uses the affine line to parameterize homotopies. Voevodsky developed this theory with a specific objective in mind: prove the Milnor conjecture. He succeeded in this goal and won the Fields Medal for his efforts in 2002.

In this talk, I will present an ongoing project in collaboration with Frédéric Déglise and Fangzhou Jin where we realize Ayoub's conjectural program showing that the heart of the motivic stable homotopy category over appropriate base schemes can be related to a suitable version of relative Milnor-Witt modules.

Orateur: FELD, Niels

ID de Contribution: 12

Type: **Non spécifié**

Double categories as a model for $(\infty,1)$ -categories

vendredi 25 octobre 2024 09:15 (55 minutes)

In this talk, I will present a joint work with Lyne Moser where we prove that double categories model $(\infty,1)$ -categories. More precisely, we equip the category of double categories with a model category structure and show that it is Quillen equivalent to the Rezk model category structure on bisimplicial sets.

I will also explain how this model of $(\infty,1)$ -categories is related to other “categorical” models, such as categories internal to simplicial sets due to Horel, relative categories due to Barwick and Kan and 2-categories due to Pavlov.

Finally, I will present some conjectural nice features of this model of $(\infty,1)$ -categories, which are motivating on their own.

Orateur: GUETTA, Léonard

ID de Contribution: 13

Type: **Non spécifié**

On the equivalence invariance of formal category theory

vendredi 25 octobre 2024 10:15 (55 minutes)

Equipments, a special kind of double categories, have shown to be a powerful environment to express formal category theory. We build a model structure on the category of double categories and double functors whose fibrant objects are the equipments, and combine this together with Makkai's early approach to equivalence invariant statements in higher category theory via FOLDS (First Order Logic with Dependent Sorts) and Henry's recent connection between model structures and formal languages, to show a result on the equivalence invariance of formal category theory.

Orateur: VERDUGO, Paula

ID de Contribution: 14

Type: **Non spécifié**

Algebras over linear infinity-operads

vendredi 25 octobre 2024 11:40 (55 minutes)

Using two different subcategories A and R of Ω (the category of trees), we first define linear infinity-operads as some presheaves (over A with values in chain complexes) with additional structure maps inducing a “composition up to homotopy”. We then define algebras over such an infinity-operad X as presheaves (over R with values in chain complexes) with structure maps encoding an “action up to homotopy” of X .

We will give some examples and some intuition behind these definitions.

For these operads and algebras, we define generalized bar&cobar constructions and prove they satisfy a Koszul duality.

This is a joint work with Ieke Moerdijk.

Orateur: HOFFBECK, Éric

ID de Contribution: 15

Type: **Non spécifié**

Model categories

lundi 21 octobre 2024 10:00 (50 minutes)

Orateur: SÃO JOÃO, José

ID de Contribution: **16**

Type: **Non spécifié**

Simplicial sets and quasi-categories

lundi 21 octobre 2024 14:00 (50 minutes)

Orateur: KLEIN, Tommy-Lee

ID de Contribution: 17

Type: **Non spécifié**

Integration along the fiber for gebras over dioperads

jeudi 24 octobre 2024 09:00 (55 minutes)

Given a monoidal adjunction and a certain orientation datum on the right adjoint F , I will explain how to transport gebras over dioperads along F , via endowing this functor with a shifted Frobenius monoidal structure. This procedure generalizes so-called integration along the fiber, which is for instance the case when F is the pushforward of a projection $X \times M \rightarrow X$, with M a closed oriented manifold.

Applied to the dioperad of shifted Lie bialgebras, the above construction can be regarded as a toy model of a conjectural AKSZ construction for shifted Poisson target (in the spirit of Pantev-Toën-Vaquié-Vezzosi's theorem on shifted symplectic structures). Time permitting, I shall discuss this application and justify the previous claim.

Orateur: POURCELOT, Hugo (LAGA)

ID de Contribution: 18

Type: Non spécifié

Deformation theories and pre-Lie algebras with divided powers in positive characteristic

jeudi 24 octobre 2024 10:00 (55 minutes)

An important result in deformation theory over a field of characteristic 0 asserts that every deformation problem can be controlled by a differential graded Lie algebra. More precisely, every solution of a deformation problem over a field of characteristic 0 can be seen as a Maurer-Cartan element in some dg Lie algebra L . The isomorphism classes of deformation problems are also in correspondence with the classes of Maurer-Cartan elements under the action of the integration of L into a Lie group called the gauge group. In 2015, Dotsenko-Shadrin-Vallette developed the deformation theory controlled by pre-Lie algebras, which are examples of Lie algebras, over a field of characteristic 0. They showed that the gauge group and its action on the Maurer-Cartan elements can be expressed in terms of pre-Lie operations. In this talk, we generalize such results in the positive characteristic context by developing a deformation theory controlled by pre-Lie algebras with divided powers. We also prove that this deformation theory satisfies a Goldman-Millson theorem which is valid over the integers. We apply this deformation theory to the computation of operad morphisms up to homotopy from the cobar construction of an augmented cooperad to an augmented operad.

Orateur: VERSTRAETE, Marvin

ID de Contribution: 19

Type: **Non spécifié**

Homotopical Dold-Kan Correspondences

jeudi 24 octobre 2024 14:30 (55 minutes)

Grothendieck's theory of test categories allows to characterize small categories with the property that an appropriate localization of their categories of presheaves modelize the homotopy category of spaces. Any test category then allows to do homotopy theory just as well as traditional simplicial sets can.

However, simplicial sets exhibit other niceties. Among them is the Dold-Kan correspondence: simplicial abelian groups also form a model for homology types, after an appropriate localization.

In this talk, we will see how we can hunt for homotopical Dold-Kan correspondences for presheaves in abelian groups over test categories and we will give some examples, including Joyal's category Θ .

Orateur: HUBERT, Léo

ID de Contribution: 20

Type: Non spécifié

Mini-cours - Free and equal higher categories

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Orateur: OZORNOVA, Viktoriya

ID de Contribution: 21

Type: **Non spécifié**

Rectification of operadic left fibrations

jeudi 24 octobre 2024 15:30 (55 minutes)

By a result of Heuts-Moerdijk, the ∞ -category of simplicial diagrams on the nerve of a discrete category A is equivalent to that of left fibrations over the nerve of A . This is an instance of the well known Grothendieck-Lurie straightening-unstraightening theorem.

In this talk, we will explain how one can generalize this result to the operadic case. More specifically, by working with the dendroidal formalism we show how, given any discrete operad P , one can functorially rectify an operadic left fibration over the dendroidal nerve of P and obtain a simplicial algebra on P . After explaining how this extends an analogous functor for categories, we prove that it establishes an adjunction of ∞ -categories between operadic left fibrations over the nerve of P and simplicial P -algebras. It is a work in progress that it establishes an equivalence of ∞ -categories, which would be a first step towards operadic straightening-unstraightening!

If time permits, we will conclude the exposition by presenting possible future applications.

Orateur: PRATALI, Francesca (Université Sorbonne Paris Nord)

ID de Contribution: 22

Type: **Non spécifié**

Monoids and (1-)toposes

jeudi 24 octobre 2024 16:45 (55 minutes)

My work revolves around monoids acting on things, especially in the context of (1-)topos theory. As such, it is through this lens that I view the ingredients of algebraic geometry, and I will tell you about this perspective. From a research perspective, this work hasn't gone very far yet; I merely intend to sketch out for you a different way of setting up the big picture. Since (Grothendieck) 1-toposes probably won't otherwise have been discussed much this week, I'll take some time to reflect on the basic properties and constructions of these objects.

Orateur: ROGERS, Morgan

ID de Contribution: **23**

Type: **Non spécifié**

Pause café

ID de Contribution: 24

Type: **Non spécifié**

2-categories I

lundi 21 octobre 2024 11:00 (50 minutes)

Orateur: EL ALLAoui, Benachir

ID de Contribution: 25

Type: **Non spécifié**

2-categories II

lundi 21 octobre 2024 15:00 (50 minutes)

Orateur: GUÈS, Nicolas

ID de Contribution: 26

Type: **Non spécifié**

Models of $(\infty, 1)$ -categories

lundi 21 octobre 2024 16:30 (50 minutes)

Orateur: LAUBIE, Paul

ID de Contribution: 27

Type: **Non spécifié**

Bonus: question session

lundi 21 octobre 2024 17:30 (30 minutes)