

1 Schedule

	Monday, September 5th	Tuesday, September 6th
9:00 - 9:15	Welcome	
9:15 - 10:15	Michel Van den Bergh <i>Amphi Hermite</i>	Osamu Iyama <i>Amphi Hermite (online talk)</i>
10:15 - 10:45	Coffee break <i>Cafeteria IHP</i>	Coffee break <i>Cafeteria IHP</i>
10:45 - 11:45	Bertrand Toen <i>Amphi Hermite</i>	Gustavo Jasso <i>Amphi Hermite</i>
11:45 - 12:45	Fan Qin <i>Amphi Hermite (online talk)</i>	Bernard Leclerc <i>Amphi Hermite</i>
12:45 - 14:45	Lunch break	Buffet <i>Cafeteria IHP</i>
14:45 - 15:45	Wendy Lowen <i>Amphi Hermite (online talk)</i>	Ryo Fujita <i>Amphi Hermite</i>
15:45 - 16:45	Sarah Scherotzke <i>Amphi Hermite (online talk)</i>	Maxim Kontsevich <i>Amphi Hermite</i>
16:45 - 17:15	Coffee break <i>Cafeteria IHP</i>	
17:15 - 18:15	Denis-Charles Cisinski <i>Amphi Hermite</i>	

2 Titles and Abstracts

Michel Van den Bergh : TBA

Denis-Charles Cisinski : *Detecting almost perfect complexes*

In a recent series of papers around the notion of approximable triangulated category, Amnon Neeman has revisited representability theorems in derived categories with finiteness constraints, generalizing previous results of Bondal, Van den Bergh, and Rouquier. Interpreting Neeman's contributions through stable infinity-categories, together with earlier results of Lipman and Neeman on almost perfect complexes (aka pseudo-coherent complexes), leads to additional new improvements.

Ryo Fujita : *Isomorphisms among quantum Grothendieck rings and their applications*

Quantum Grothendieck ring is a one-parameter deformation of the Grothendieck ring of the monoidal category of finite-dimensional modules over the quantum loop algebras, endowed with a canonical basis. In the case of type ADE, thanks to the geometry of quiver varieties, the canonical basis is known to compute the q-characters of simple modules (via the analog of Kazhdan-Lusztig algorithm) and enjoy some positivity properties. In this talk, we discuss a collection of isomorphisms between the quantum Grothendieck ring of type BCFG and that of "unfolded" type ADE, which respect the canonical bases and admit a cluster theoretic interpretation. They are applied to verify the same positivity properties in type BCFG and the analog of Kazhdan-Lusztig conjecture for several new cases. This is a joint work with David Hernandez, Se-jin Oh, and Hironori Oya.

Osamu Iyama : *Quiver representations and Cohen-Macaulay representations*

I will compare two well-studied classes of representations : quiver representations and Cohen-Macaulay representations. The representation-finite algebras in both classes are parametrized by

Dynkin diagrams by theorems due to Gabriel and Buchweitz-Greuel-Schreyer. Both classes give rise to Calabi-Yau triangulated categories : cluster categories and singularity categories. I will explain that there are a number of triangle equivalences between cluster categories and singularity categories. This is a joint work with Norihiro Hanihara.

Gustavo Jasso : *The Triangulated Auslander-Iyama Correspondence*

This talk is based on joint work with Fernando Muro (Sevilla). Previous work of Muro establishes the existence and uniqueness of (DG) enhancements for triangulated categories which admit an additive generator whose endomorphism algebra is finite-dimensional (over a perfect field). In this talk I will present a generalisation of this result that allows us to treat a larger class of triangulated categories, which instead admit a generator with a strong regularity property (a so-called dZ-cluster tilting object). I will explain our result as well as how, combined with crucial results of August and Hua-Keller, it leads to a positive solution of the Donovan-Wemyss Conjecture for contraction algebras as observed by Keller.

Maxim Kontsevich : *Algebraic structure for the planar limit of matrix models*

This talk is inspired by recent results by V.Kazakov and Z.Zheng on the analytic bootstrap for matrix models. Observables in the planar limit satisfy an infinite system of quadratic equations, called loop equations (analogous of Schwinger-Dyson equations/Ward identities, meaning that the integral of a total derivative is zero). I'll talk about the cohomological reformulation of these constraints, in terms of a new dg commutative algebra associated with a quiver with polynomial potential. In the case of quartic interaction for two matrices, considered by Kazakov and Zhang, the polynomial growth indicates that there is a good chance for integrability.

Bernard Leclerc : *Quiver representations and quantum affine algebras*

In joint work with David Hernandez, we have attached to an arbitrary Cartan matrix an infinite quiver with relations. In this talk I will review this construction and present some categories of representations of this bound quiver. I will then discuss connections between these quiver representations and the representation theory of the quantum affine algebra corresponding to the same Cartan matrix.

Wendy Lowen : *Enriching the nerve construction (joint with Arne Mertens)*

This talk bridges between noncommutative geometry and higher category theory. A famous link between the two subjects is given by the DG nerve, which turns a DG category into a quasi-category. In this talk, we will enrich this construction keeping track of the linear features of the DG category. More generally, this leads to a notion of quasi-categories in a monoidal category V , which should model weak enrichment in the category of simplicial V objects.

Fan Qin : *Categorification of cluster algebras and their bases*

Cluster algebras are algebras with combinatorial structures. One fundamental problem in studying these algebras is looking for good bases. In particular, their generic bases (dual semi-canonical bases) arise from Calabi-Yau categories, while their triangular bases (Kazhdan-Lusztig type bases) arise from monoidal categories. We will present known results and some recent progress in this direction.

Sarah Scherotzke : *Cotangent complexes of moduli spaces*

We explain how shifted symplectic structures on derived stacks are connected to Calabi-Yau structures on differential graded categories. More concretely, we will show that the cotangent complex to the moduli stack of a differential graded category A is isomorphic to the moduli stack of the *Calabi-Yau completion* of A , answering a conjecture of Keller-Yeung.

This is joint work with Damien Calaque and Tristan Bozec arxiv.org/abs/2006.01069.

Bertrand Toen : *The Hilbert group scheme*

I will present a certain abelian flat group scheme (over \mathbb{Z}), called the Hilbert group scheme, and some of its applications in various settings : algebraic models for homotopy types, HKR theorems and algebraic foliation theory.