Titles and abstracts for the workshop on infinity operads

June 8, 2018

Pedro Boavida: Presentations of configuration categories
The configuration category of a manifold "globalizes" the little disks operad (which is in a precise sense closely related to the configuration category of Euclidean space). These infinity categories feature prominently in recent homotopical descriptions of the spaces of smooth embeddings, and (variants of these) also feature in factorization homology. The added generality can also help tackle (and formulate) fundamental questions about the little disks operads. In this talk, I will discuss joint work in progress with M. Weiss whose aim is to give presentations (as in generators and relations) of the configuration category. Under mild finiteness conditions on the manifold, and in the truncated case, these presentations are finite.

Lukas Brantner: Formal Moduli Problems via Partition Lie Algebras
If k is a field of characteristic zero, a theorem of Lurie and Pridham establishes an equivalence between formal moduli problems and differential graded Lie algebras over k. We generalise this equivalence in two different ways to arbitrary ground fields by using "partition Lie algebras". These mysterious new gadgets are intimately related to the genuine equivariant topology of the partition complex, which allows us to access the operations acting on their homotopy groups (relying on earlier work of Dyer-Lashof, Priddy, Goerss, and Arone-B.). This is joint work with Mathew.

Michael Ching: Day convolution and infinity-operads in Goodwillie calculus
We can associate to each pointed compactly-generated infinity-category C a stable (non-unital) infinity-operad whose mapping spectra capture the Goodwillie derivatives of the identity functor on C. The derivatives of functors from C to D then form a bimodule over the corresponding infinity-operads. This construction generalizes my previous work with Greg Arone on the spectrum and based spaces cases, and can be viewed as Koszul dual to the approaches of Lurie and Heuts to similar questions. We can give fairly explicit constructions of the infinity-operads and bimodules in question based on the Day convolution for symmetric monoidal infinity-categories of Glasman.

I will try also to describe more speculative work on the role of pro-operads in Goodwillie calculus. In particular, I'll give a (likely vague) definition of pro-operad and try to say how such objects, and their bimodules, might be used to classify Taylor towers.

Hongyi Chu: Presheaf models for algebraic structures
Many infinity-categorical objects such as (∞, n)-categories or infinity-operads can be viewed as certain types of presheaves. By generalizing this idea we will define enriched infinity operads and show that their infinity category satisfies nice properties due to the simplicity of this presheaf

model. At the end of this talk we will see that the enrichment construction is general enough to define algebras in symmetric monoidal infinity categories as presheaves and to study important constructions thereof. This talk is based on joint work with Rune Haugseng.

Javier Gutierrez: On N-infinity operads and a conjecture by Blumberg and Hill
Blumberg and Hill introduced the notion of N-infinity operads as an equivariant generalization of E-infinity operads. These are operads in G-spaces that are universal for certain families of subgroups of products of G with the symmetric groups. They provide different types of equivariant commutativity interpolating between G-trivial E-infinity operads and genuine G-E-infinity operads. Blumberg and Hill also conjectured a characterization of N-infinity operads in terms of 'indexing systems'. In this talk, I will explain how to prove this conjecture by using suitable model structures on the category of equivariant operads in which N-infinity operads are cofibrant replacements of the terminal operad. This is a joint work with David White.

Rune Haugseng: Infinity-operads via symmetric sequences
A useful description of operads is that they are associative monoids in symmetric sequences. I'll discuss an analogous description of (enriched) infinity-operads, obtained by a generalization of Day convolution to certain double infinity-categories. This can be used to describe algebras for enriched infinity-operads, and also gives rise to a bar-cobar adjunction for infinity-operads.

Hadrian Heine: A monadic approach to Lie theory
We give a model of (restricted) Lie algebra in a preadditive presentably symmetric monoidal infinity-category C as an algebra over the monad L associated to an adjunction between C and the category of cocommutative bialgebras in C, where the left adjoint takes the tensor-algebra.

For every field K we construct a functor compatible with the forgetful functors from L-algebras in connective K-module spectra to the infinity-category underlying a model structure on simplicial Lie algebras respectively simplicial restricted Lie algebras over K depending on whether the char. of K is zero or positive. If the char. of K is zero, we show that this functor is an equivalence.

Geoffroy Horel: Formality of the little disks operad with torsion coefficients
It is known that the little disks operad is formal over $\mathbb{Q}$. This was proved by Tamarkin for the little 2-disks operad and by Kontsevich and Lambrechts-Volic in higher dimension. It can be easily shown that this formality result cannot hold with coefficients in a field of positive characteristic. Nevertheless, I will talk about a partial formality result that holds for those operads. This is joint work with Joana Cirici and Pedro Boavida de Brito.

Joost Nuiten: Cohomology of higher categories
Classical obstruction theory studies the space of maps between two spaces in terms of cohomology with local coefficients. In this talk, I will describe a similar obstruction theory for $(\infty, 1)$- and $(\infty, 2)$-categories, using cohomology with coefficients in local systems over the twisted arrow category and the 'twisted 2-cell category'. As an application, I will give an obstruction-theoretic argument that shows that adjunctions can be made homotopy coherent (as proven by Riehl-Verity). This is joint work with Yonatan Harpaz and Matan Prasma.

Markus Spitzweck: Infinity categories with genuine duality and hermitian K-theory
In the talk I will define the concept of an infinity category with genuine duality, a refinement of

a duality. I will compare two models for this notion. Then Waldhausen infinity categories with genuine duality and hermitian K-theory of those will be discussed. This is joint work in progress with Hadrian Heine and Paula Verdugo.

Tashi Walde: 2-Segal spaces as invertible ∞-operads
We exhibit the simplex category Δ as an ∞-categorical localization of Moerdijk-Weiss' category Ω_π of plane rooted trees. As an application we obtain an equivalence of ∞-categories between Dyckerhoff-Kapranov's 2-Segal simplicial spaces and invertible complete dendroidal Segal spaces, a.k.a. invertible non-symmetric ∞-operads. We discuss variants, where Δ is replaced by Connes' cyclic category Λ, the category of finite pointed sets or the category of non-empty finite sets; the corresponding categories of trees are given by plane trees, rooted trees and abstract trees, respectively.

Michael Weiss: The truncation spectral sequence for spaces of derived maps between topological operads
Let P and Q be topological operads, more precisely, operads enriched in spaces. I am planning to describe a tower of fibrations converging to the space of derived maps from P to Q. According to Cisinski and Moerdijk, the homotopy theory of topological operads is equivalent to the homotopy theory of dendroidal spaces, contravariant functors from the dendrex category to the category of spaces, if we impose a "Segal" condition among others. From this point of view, the tower can be constructed by restricting the dendroidal spaces corresponding to P and Q to certain full subcategories of the dendrex category which form an increasing (and exhausting) sequence. These restrictions correspond to "truncating", forgetting operations in P and Q whose number of inputs exceeds a fixed k. Main theorem: under some conditions on P and Q, the layers of the tower admit a nice description.

The little disk operads satisfy the conditions. Surprisingly, this tower or spectral sequence seems to be quite different from other towers or spectral sequences which have been constructed recently for similar purposes. — To a large extent this talk will be a report on the PhD thesis, in progress, of F Goeppl.