Higher Geometric Structures along the Lower Rhine X

October 19 and 20, 2017

Venue:
Hans Freudenthal Building, rm. 611
Utrecht Science Park ‘De Uithof’
Budapestlaan 6, 3584 CD Utrecht, The Netherlands

Thursday, October 19

13.30 – 14.00
Welcome and coffee in library/7th floor

14.00 – 15.00 **Janez Mrčun**
Monodromy groups of Lie groupoids

15.15 – 16.15 **Paul-André Melliès**
On bifibrations of model structures

16.15 – 16.45
Coffee break in library/7th floor

16.45 – 17.45 **Gijs Heuts**
Lie algebras and v_n-periodic spaces

18.30 **Conference dinner** in the Faculty Club,
Domplein 29, 3512 JE Utrecht

Friday, October 20

09.45 – 10.00
Coffee in room 611

10.00 – 11.00 **Tobias Dyckerhoff**
A categorified Dold-Kan correspondence

11.15 – 12.15 **Álvaro de Pino Gomez**
Haefliger structures and the h-principle

12.15 – 13.30
Lunch Break in Library/7th floor

13.30- 14.30 **Kirsten Wang**
Desingularizing proper Lie groupoids using blow-ups

14.30 – 15.00
Coffee break in library/7th floor

15.00 – 16.00 **Christian Blohmann**
Higher geometric principal bundles

Abstracts: see next page.

Abstracts

Christian Blohmann (MPI Bonn)

Higher geometric principal bundles

I will review three equivalent definitions of principal group bundles and explain how these definitions and the equivalences between them generalize to higher geometric groupoids. The crucial ingredient is the higher version of principal Lie groupoid bibundles in terms of correspondences of simplicial manifolds. This requires some new technical gadgets, in particular a finitary method of left fibrant replacement by universal simplicial subdivision. This is joint work with C. Zhu.

Álvaro del Pino Gomez (Utrecht University)

Haefliger structures and the h-principle

Shortly after Gromov's thesis, Haefliger showed that the h-principle could be used to construct foliations on open manifolds. More precisely, he showed that, up to homotopy, foliations are in correspondence with Haefliger structures. A (perhaps) less known result of his is that Haefliger structures also provide a useful framework when one studies h-principles for other geometries.

In their wrinkle saga, Eliashberg and Mishachev explained what a wrinkled map is (with several flavours) and they showed that they satisfy the h-principle. Recently, Borman, Eliashberg, and Murphy proved the h-principle for overtwisted contact structures in higher dimensions; one of the key conceptual steps in the proof is constructing a suitable overtwisted disc which, in some sense, is a "wrinkle in the contact category" satisfying a quantitative constraint.

The purpose of my talk is to explain how Haefliger structures provide the correct language for defining what a wrinkle is for any geometry.

Tobias Dyckerhoff (Bonn University)

A categorified Dold-Kan correspondence

Various recent developments, in particular in the context of topological Fukaya categories, seem to be glimpses of an emerging theory of categorified homotopical and homological algebra. The increasing number of meaningful examples and constructions make it desirable to develop such a theory systematically. In this talk, we discuss a step towards this goal: a categorification of the classical Dold–Kan correspondence.

Gijs Heuts (Utrecht University)

Lie algebras and v_n-periodic spaces

Quillen showed that the homotopy theory of simply-connected rational spaces is equivalent to that of differential graded rational Lie algebras and of cocommutative differential graded coalgebras. In this talk I will outline generalizations of these results to v_n-periodic homotopy theory, where the case n=0 is rational homotopy.

Paul-André Melliès (Université Paris Denis Diderot)

On bifibrations of model structures

In this talk, I will formulate a notion of Quillen bifibration which combines the two notions of Grothendieck bifibration and of Quillen model structure. In particular, given a bifibration p: E --> B, I will characterize when a family of model structures on the fibers E_A and on the basis category B combines into a model structure on the total category E, such that the functor p preserves cofibrations, fibrations and weak equivalences. Using this Grothendieck construction for model structures, I will revisit the traditional definition of Reedy model structures, and possible generalizations, and exhibit their bifibrational nature. This is joint work with Pierre Cagne.

More about this work will be found here: https://arxiv.org/abs/1709.10484

Janez Mrčun (University of Ljubljana)

Monodromy groups of Lie groupoids

For any homomorphism F from a Lie group K to a Lie groupoid G we have the associated monodromy group. This group is a subgroup of Aut(K) and relates to deformations of the homomorphism F. Monodromy groups are Morita invariants of Lie groupoids and can be used to test if a Lie groupoid lacks faithful representations.

Kirsten Wang (University of Amsterdam), joint work with Xiang Tang and Hessel Posthuma.

Desingularizing proper Lie groupoids using blow-ups

In this talk we discuss how any proper Lie groupoid can be made regular by successively blowing up its singular strata. More generally we discuss the process of blowing-up saturated submanifolds along which the Lie groupoid is linearizable. We further discuss how, when the groupoid is Riemannian, the blow-up construction can be made compatible. Finally we show our construction is invariant under Morita equivalences, both of Lie groupoids and of Riemannian Lie groupoids.