Higher Geometric Structures along the Lower Rhine XVI
16-17 February 2023 – Utrecht University

Location

Talks take place in Utrecht,
The Netherlands (Travel Directions)

Preliminary program

16 February in MIN-201

14:00 - 15:00: Victoria Hoskins

15:15 - 16:15: Maarten Mol

16:15 - 16:45: Coffee break

16:45 - 17:45: Miguel Barrero

18:30: Conference Dinner

17 February in Pangea

09:45 - 10:00: Coffee

10:00 - 11:00: Guillaume Laplante-Anfossi

11:15 - 12:15: Aldo Witte

12:15 - 14:00: Lunch break in Library HFB

14:00 - 15:00: Guy Boyde

15:00 - 15:30: Coffee break

15:30 - 16:30: Rui Fernandes

Registration

Register for this workshop.

Description

This is the sixteenth in a series of short workshops jointly organized by geometers and topologists from Bonn, Nijmegen and Utrecht, all situated along the Lower Rhine. The focus lies on the development and application of new structures in geometry and topology such as Lie groupoids, differentiable stacks, Lie algebroids, generalized complex geometry, topological quantum field theories, higher categories, homotopy algebraic structures, higher operads, derived categories, and related topics.

Previous Meetings

Earlier editions of these workshops were:
I (MPIM Bonn), II (Nijmegen), III (Utrecht), IV (MPIM Bonn), V (Nijmegen), VI (Utrecht), VII (Leuven), VIII (MPIM Bonn), IX (Nijmegen), X (Utrecht), XI (MPIM Bonn), XII (Nijmegen), XIII (Utrecht), XIV (MPIM Bonn), XV (Nijmegen)

Organizers

The workshop series is organized by Christian Blohmann, Marius Crainic, Ioan Mărcuț, Ieke Moerdijk and Steffen Sagave

Titles and abstracts

Miguel Barrero (Radboud University Nijmegen):

Global N_∞-operads

Abstract: Global homotopy theory is the study of global spaces and global spectra, which have compatible actions by all compact Lie groups at the same time. Global spaces and global spectra with a multiplication posses a rich structure, and they appear representing certain equivariant cohomology theories. When working homotopically, such a multiplication is generally modeled using operads.
In this talk I will introduce global N_∞-operads, that parametrize multiplications on global spaces with intermediate levels of commutativity. This intermediate commutativity is seen in the existence of certain transfer maps between the homotopy groups of the global space. The global transfer system associated to a global N_∞-operad is the collection of the transfer maps that it parametrizes. I will present a classification of global N_∞-operads in terms of their associated global transfer systems.

Guy Boyde (Utrecht University):

How big are the homotopy groups of spheres? A functor calculus approach.

Abstract: The (stable and unstable) homotopy groups of spheres are very classical objects which are, infamously, very poorly understood. Recent work of Burklund and Senger has greatly advanced our understanding of many aspects of these groups. Here, we will discuss their bounds on the `growth' of the size of the torsion components at different primes. I will explain (from a user's point of view) what Goodwillie Calculus is, and how it can be used to refine this part of their work. We'll then get back to the big picture and discuss how sharp these bounds are likely to be.

Rui Fernandes (Urbana-Champaign):

Multiplicative and Infinitesimal Multiplicative Ehresmann Connections

Abstract: I will discuss a theory of connections for bundle of ideals in a Lie groupoid. This theory generalizes the usual theory of principal bundle connections and has an infinitesimal counterpart at the Lie algebroid level. Applications of this theory range from (i) obtaining representatives in rational cohomology for the Dixmier-Douady class of a gerbe to (ii) constructing linear models for Poisson structures around Poisson submanifolds. This talk is based on the preprints arXiv:2204.08507 and arXiv:2205.11457, joint with Ioan Marcut (Radboud Universiteit Nijmegen).

Victoria Hoskins (Radboud University Nijmegen):

Motivic mirror symmetry for Higgs bundles

Moduli spaces of vector bundles and Higgs bundles on curves play an important role in geometry, representation theory and mathematical physics. Moduli spaces of Higgs bundles for dual Langlands groups are expected to be related by a form of mirror symmetry, which predicts relations between their derived categories and various cohomological invariants. After surveying the mirror symmetry predictions for Higgs moduli spaces and giving an introduction to motives, I will present a form of mirror symmetry for Higgs bundles for the dual Langlands groups SL_n and PGL_n; this is joint work with Simon Pepin Lehalleur.

Guillaume Laplante-Anfossi (MPIM Bonn/University of Melbourne):

Diagonals of polytopes and higher structures

Abstract: The set-theoretic diagonal of a polytope has the crippling defect of not being cellular: its image is not a union of cells. One is thus looking for a cellular approximation to the diagonal. Finding such an approximation in the case of the simplices and the cubes is of fundamental importance in algebraic topology: it allows one to define the cup product in cohomology. I will present a general method, coming from the theory of fiber polytopes of Billera and Sturmfels, which permits to solve this problem for any family of polytopes. I will then explain how this machinery, applied to new families of polytopes, gives us the tools to define higher algebraic objects such as the tensor product of homotopy operads or a functorial tensor product of A-infinity categories.

Maarten Mol (MPIM Bonn):

On the classification of complexity-zero Hamiltonian actions of regular, proper symplectic groupoids.

Abstract: This talk concerns the classification of certain non-commutative integrable systems with elliptic singularities, for which the momentum map takes values in a regular Poisson manifold of compact type and comes equipped with an action of the corresponding symplectic groupoid. Examples of these include symplectic toric manifolds, proper Lagrangian fibrations and proper isotropic realizations of Poisson manifolds of compact type. The aim will be to explain a classification of these systems in terms of "Delzant polytopes" in the leaf space of the symplectic groupoid.

Aldo Witte (Leuven):

Classification of a class of Lie algebroids

Abstract: We will study a class of Lie algebroids which are called of b^k-type. These consist of vector fields on a manifold with `higher order tangencies' to a prescribed hypersurface. The hypersurface alone is not sufficient to describe these Lie algebroids; we will show that one needs the data of a jet of distribution involutive to a certain order. Our main result is that all Lie algebroids of b^k-type can be obtained in this manner. We will also consider questions for similar classes of Lie algebroids which will be defined in terms of (jets of) Lie filtrations or Haefliger structures. Joint work with Álvaro del Pino Gómez.