BCGU-W Research Retreat

Junior and research retreat

Book of Abstracts

Zell am Main, Germany
5th – 8th of December, 2025

Contents

Scientific Program Schedule

Time	Friday 05.12.25	Saturday 06.12.25	Sunday 07.12.25	Monday 08.12.25
08:00-09:00		Breakfast	Breakfast	Breakfast
09:15-10:05		Florian Dorsch	David Aretz	Departure (Checkout before 9AM)
10:10-11:00		Janina Bernardy	Annika Kraasch-Tarnowsky	
11:00-11:55		Rosa Marchesini	Sven Holtrop	
12:00-13:00		Lunch	Lunch	
13:15-14:00		Gong talks	Gong talks	
14:00-15:00		Coffee and cake	Coffee and cake	
15:00-17:00	Arrival	Project writing and peer mentoring	Hike	
17:00-18:00			Informal Discussion	
18:00-19:00	Dinner	Dinner	Dinner	
Evening	Networking	Individual mentoring	Informal discussion and pub quiz	

Abstracts: long talks

Van Est differentiation of higher Lie groupoids

Speaker: Florian Dorsch
Abstract: In this talk, I will present a generalization of the Van Est map to the setting of higher Lie groupoids. After a short introduction to Ševera differentiation, I will discuss several key properties of the generalized Van Est morphism and show how it recovers classical Van Est constructions. I will further sketch how to compute the associated higher Lie brackets and demonstrate how the framework can be applied to differentiate simplicial Lie groups.

Obstruction theory for Hamiltonian actions on (multi-)symplectic manifolds

Speaker: Janina Bernardy
Abstract: This is a survey talk on obstruction theory for Hamiltonian actions on (multi-)symplectic manifolds. We will start by briefly reviewing symplectic and Hamiltonian actions in symplectic geometry. While it is a classical result that the obstruction to existence and uniqueness of a momentum map for a given Lie algebra action on a symplectic manifold is characterized by the cohomology of the Lie algebra, the corresponding obstruction theory for Hamiltonian actions on multisymplectic manifolds was developed more recently by Callies, Frégier, Laurent-Gengoux, Rogers and Zambon, and independently by Ryvkin and Wurzbacher. We will recall the basic notions of multisymplectic geometry such as the L_∞-algebra of Hamiltonian forms and the definition of homotopy momentum maps in order to present the characterization of Hamiltonian Lie algebra actions on multisymplectic manifolds in cohomological terms.

On the homotopy invariance of twisted Lie algebroid cohomology

Speaker: Rosa Marchesini
Abstract: The Lie algebroid cohomology is not invariant under smooth curves of Lie algebroid morphisms. Balcerzak first proved that this invariance does hold when one works with homotopies in the category of Lie algebroids, the so-called LA-homotopies. In a joint project with M. Jotz, we developed a systematic study of LA-homotopies and proved that the more general twisted Lie algebroid cohomologies are homotopy invariant. In this talk, I will present these results and illustrate their use in the study of the twisted LA-cohomology of certain families of Lie algebroids.

Topological K-Theory of super algebras and the Bott clock

Speaker: David Aretz
Abstract: Twists of topological K-theory can be described, in a precise and geometric sense, by bundles of super algebras. This viewpoint replaces vector bundles with bundles of modules over a Z/2-graded Banach algebra A, and therefore requires a robust definition of topological K-theory for such "super" algebras. In this talk I will explain how the modern perspective on spectra—as the group completion of symmetric monoidal ∞-groupoids—provides a natural and conceptual foundation for this construction. Using this framework, I will revisit the classical Atiyah–Bott–Shapiro description of KO via Clifford modules, define a connective spectrum-level version of Karoubi K-theory for graded Banach algebras, and state a comparison theorem identifying it with Karoubi's original groups. Time permitting, I will illustrate how this approach recovers the initial stages of the Bott periodicity clock.

Representations up to homotopy and differentiable stack cohomology of proper Lie groupoids

Speaker: Annika Kraasch-Tarnowsky
Abstract: Computing the differentiable stack cohomology associated to a proper Lie groupoid is a problem that has been studied for some years now in the expectation to find an infinitesimal model. However, the problem has only been solved concerning special cases, such as regular groupoids. The starting point for general proper Lie groupoids is the Bott-Shulman-Stasheff bicomplex, which consists of differential forms on the different levels of the nerve of the groupoid. It is of great interest to study its columns in particular, based on observations on examples as well as structural reasons. While there are various explicit models for the cohomology of these columns in special cases, Abad has introduced representations up to homotopy to obtain expressions that can be defined generally. In this talk, we will review the general notions as well as their application to the given context, relate them to recent developments and talk about open questions and ongoing research.

An introduction to Hopf algebroids

Speaker: Sven Holtrop
Abstract: Hopf algebroids are supposed to be a non-commutative generalization of groupoids and Lie algebroids, similarly to how Hopf algebras are a non-commutative generalization of groups and Lie algebras. However, it turns out that there are multiple potential generalization. The goal of this talk is to give an intuitive introduction to two of these generalizations: the left/right-Hopf algebroids and full Hopf algebroids; to understand the distintinction in specific examples; and to see how well they generalise the theory of Hopf algebras, Lie algebroids and groupoids.

Gong talks

Saturday 06.12.25

1. Camilo Angulo
2. Francesco Cattafi
3. Kalin Krishna
4. Jorn van Voorthuizen

Sunday 07.12.25

1. Rodrigo Baptista
2. Oscar Cosserat
3. Karandeep Singh
4. Dan Wang

Mentoring sessions

We have scheduled a peer mentoring session, in which senior postdocs can advise younger postdocs, PhD and master students, as well as individual mentoring sessions. Participation in each session is entirely voluntary.

We do not specify a singular purpose or topic for these sessions. Instead, for your inspiration, we give below some possible discussion points, some general and some [specific].

Jobs

- How, where, and when to apply?
- How to determine if a job is suitable for me?
- What are the strengths or weaknesses of my CV?
- What are the different paths in academia?

Networking

- How to find or what my precise area or community is?
- Feedback on your presentation and communication skills
- What talks to give, and where to give them?
- Imposter syndrome and insecurities

Academia

- Minorities, hierarchies, and discrimination in academia
- How do I choose a project?
- How do I move beyond my PhD project?
- When and how should I seek collaborations?
- Where to find help if bullied at work or in the community?
- Building mental resilience against psychological violence within academia
- Navigating the publishing process

Life

- Balancing work, life, and family
- Managing geographic uncertainty in the early stages of a career

This list is non-binding and non-exhaustive! What you discuss is between you and your mentor. We encourage discussions ranging from the concrete to the philosophical, and from the short-term to long. Details will also be given at the retreat.

For more information, visit the website: BCGU-W Retreat Official Website.
You can reach us at: karandeep.singh@uni-wuerzburg.de.