Book of Abstracts

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Zusammenfassung

Hier findet sich eine kurze Übersicht über die Inhalte der Vorträge des Vernetzungstreffens der Graduiertenkollegs 1150 (Bonn/Bochum/Düsseldorf) und 1692 (Regensburg). Das Vernetzungstreffen fand statt vom 24. Februar 2013 bis zum 27. Februar 2013.

1 Abstracts

Homotopy colimits in cofibration categories and quasicategories
by **Karol Szumiło**
I will present two approaches to homotopy colimits: a classical one formalized in the language of cofibration categories and a higher categorical one formalized in the langauge of quasicategories. I will discuss some basic properties of homotopy colimits and explain that the two approaches are in fact equivalent.

Motivic Homotopy Theory over deeper bases
by **Peter Arndt**
We start with an introduction for topologists to Motivic Homotopy Theory. Then we motivate the need for motives and motivic homotopy theory for schemes "over deeper bases"; these are categories of scheme-like objects coming with an adjunction (thought of as "base change") to usual schemes. In the main part of the talk we present our construction of motives for such general inputs and in the remaining time sketch some applications.

Finite von Neumann Algebras and $\mathbf{L^2}$-Invariants
by **Benjamin Küster**
For any discrete group G there is a class of Hilbert spaces called $\mathcal{N}(G)$-modules which are defined using the Hilbert space $l^2(G)$ and the finite von Neumann algebra of bounded G-equivariant operators on $l^2(G)$. Using Hilbert $\mathcal{N}(G)$-modules, one can define L^2-cohomology for a free G-CW-complex X of finite type and for a smooth cocompact free proper G-manifold M. Although the techniques used for the definitions of L^2-cohomology of X and M differ substantially, it turns out that they give the same result in the case where X is a smooth triangulation of M.

Topological T-Duality
by **Martin Ruderer**
This talk aimed to motivate the definition of topological T-duality. Let $E \to B$, $\hat{E} \to B$ be principal torus bundles and let $\mathcal{H} \to E$, $\hat{\mathcal{H}} \to \hat{E}$ be $U(1)$-banded gerbes. It was indicated how giving an equivalence between the derived categories $D^b(\mathcal{H})$ and $D^b(\hat{\mathcal{H}})$ can lead to the definition of topological T-duality.

The Geometry of Numbers and the Field with one Element
by **Philipp Vollmer**
This talk illustrates one way to adopt geometrical methods for arithmetic applications, nameley F_1-geometry. It gives a short motivation and provides a short introduction into Deitmar‘s Congruence Schemes.

Obstructions to deforming generalized complex branes
by **Braxton Collier**
Let $\mathcal{J}$ be a generalized complex structure on a smooth manifold M. A *brane* on M is a pair $(S, \mathcal{L})$, where $S \subset M$ is a submanifold, $\mathcal{L}$ is a Hermitian line bundle with unitary connection over S, and $(S, \mathcal{L})$ satisfy a certain compatibility condition with respect to $\mathcal{J}$. Standard examples include complex submanifolds (equipped with holomorphic line bundles) in the orindary complex case, and Lagrangian submanifolds (equipped with flat line bundles) in the symplectic case. I will explain a recent result on the deformation theory of such branes, which generalizes a classical result of Kodaira on deformations of compact complex submanifolds of complex manifolds.

Multiplicative orientations of K-Theory and p-adic analysis
by **Christian Nerf**
The goal of the talk is to present a method to understand the set

$$\pi_0 E_\infty(MSpin, KO_p^\wedge)$$

for a prime p. The p-adic analysis, especially the p-adic measure theory, gives the main tools for understanding this method. First we introduce the notation and some properties of a p-adic measures on a compact, totally disconnected space X, and denote the set of measures on X by $M(X, \mathbb{Z}_p)$. Because of time reasons we then present the method only for $p = 2$. The important observations made in the talk are:

- There is an injection

$$\alpha : \pi_0 E_\infty(MSpin, KO_2^\wedge) \to M(\mathbb{Z}_2^\times / \pm 1, \mathbb{Z}_2).$$

- There is a bijection

$$\beta : M(\mathbb{Z}_2^\times / \pm 1, \mathbb{Z}_2) \to M(\mathbb{Z}_2, \mathbb{Z}_2).$$

- There is a bijection

$$\gamma : M(\mathbb{Z}_2, \mathbb{Z}_2) \to \mathbb{Z}_2[[T]].$$

Finally we give a sketch of the proof for the following
Theorem. The map $\gamma \circ \beta \circ \alpha$ gives a bijection

$$\pi_0 E_\infty(MSpin, KO_2^\wedge) \to T\mathbb{Z}_2[[T]].$$

Mostow's Rigidity Theorem
by **Cristina Pagliantini and Matthias Blank**
In this mini course we give an overview of the proof of Mostow's Rigidity Theorem. First we explain the result itself and show some important applications. Then we introduce Bounded Cohomology and use it to prove the Proportionality Principle, a major step towards the Rigidity Theorem. Finally we conclude with a detailed sketch of the remaining arguments.

Transgression, Regression and string geometry
by **Steffen Wittkamp**
This talk follows [arXiv:1201.5052]. A finite-dimensional Lie-2-group model for $String(n)$ can be constructed by applying a transgression/regression technique to the basic gerbe $\mathbf{G}_{bas}$ whose Dixmier-Douady-class generates $H^3(Spin(n), \mathbb{Z})$. This is done by identifying a Mickelsson product on the transgressed gerbe $L\mathbf{G}_{bas}$ after regression with a strict multiplicative structure. Since $RL\mathbf{G}_{bas} \cong \mathbf{G}_{bas}$, we get a multiplicative structure on $\mathbf{G}_{bas}$ corresponding to a central Lie-2-group extension of $Spin(n)_{dis}$ by $\mathcal{B}S^1$.

K- and L-Theory of C^*-Algebras and the Novikov Conjecture
by **Markus Land**
I am going to explain one of my ongoing projects. To motivate why am interested in a comparison between K- and L-theory of C^*-algebras I will introduce the Novikov Conjecture and briefly relate it via surgery theory to a version of the L-theoretic Farrell-Jones Conjecture. Then I will sketch how one can deduce the Novikov Conjecture from the rational injectivity of (a version of) the Baum-Connes Conjecture given the fact that one can construct a natural comparison map between K- and L-theory spectra which is an equivalence as soon as we invert 2.

Local cohomology for (algebraic) stacks
by **Tobias Sitte**
We define the local cohomology functor for algebraic stacks like $\mathcal{M}_{\mathrm{FG}}$, the p-localized stack of formal groups, and its closed substacks $\mathfrak{Z}^n$ of formal groups of height at least n. We list some properties and compare it with local cohomology of schemes as defined in SGA_2.