Ben Antieau

Higher Brauer groups and Azumaya algebras

Cohomology groups classify twists. Working with cohomology with coefficients in the sheaf of units, degree 1 cohomology classifies line bundles, twists of the unit. The cohomology group in degree 2 classifies Azumaya algebras up to Morita equivalence in an appropriate sense; these module categories are twists of the unit dg category after a theorem of Toën. I will speak about work with David Gepner and Rune Haugseng on examples of twists in the next degree, d=3, and a conjectural, inductive framework for understanding all higher degrees. I will also explain a kind of Br=Br? theorem for d=3 which relies on new work joint with Asher Auel. In order to say something about K-theory, the subject of the workshop, degree 2 cohomology classes twist algebraic K-theory, while degree 3 classes twist secondary K-theory.

Johan Commelin

Liquid Tensor Experiment

In December 2020, Peter Scholze posed a challenge to formally verify the main theorem on liquid $\mathbb{R}$-vector spaces, which is part of his joint work with Dustin Clausen on condensed mathematics. I took up this challenge with a team of mathematicians to verify the theorem in the Lean proof assistant. In this talk I will give a very brief introduction to liquid mathematics, and a demo of Lean. Then I will describe our experiences verifying state of the art mathematics with a computer, and some prospects that I see for these tools in the future. Joint work with the mathlib/Lean community and Peter Scholze.

Tasos Moulinos

A tour through the topological K-theory of dg-categories

In this talk, I will survey some past work of mine on the topological K-theory of dg categories. This is an invariant of complex dg-categories, taking values in the infinity category of KU-module spectra. I will begin the talk with motivations coming by way of Hodge theoretic mirror symmetry, and will proceed to describe the basic construction, originally due to Blanc. I will then describe a variant of this construction from previous work, relative to any base complex scheme, together with applications of such a construction towards computations in twisted K-theory, and towards the theory of variations of Hodge structures. Time permitting, I will describe some open questions.

Morgan Opie

A compactly supported A^1-Euler characteristic via the Hochschild complex

The A^1-Euler characteristic of a smooth, projective variety over a field k is an invariant that takes values in the Grothendieck–Witt group GW(k) of equivalence classes of bilinear forms over k. In this talk, we will show that the A^1-Euler characteristic over a field k of characteristic zero can be defined using the Hochschild complex together with a canonical bilinear form. Our definition induces a map from the Grothendieck group K_0 of k-varieties to $GW(k)$, extending the definition of the A^1-Euler characteristic to all varieties over k. As time permits, we will discuss the possibility of lifting this map to a spectrum-level construction. This is joint work with Niny Arcila-Maya, Candace Bethea, Kirsten Wickelgren, and Inna Zakharevich.

Maria Yakerson

Twisted K-theory in motivic homotopy theory

Algebraic K-theory of vector bundles twisted by a Brauer class is represented by a motivic space. We will discuss some properties of these motivic spaces, as well as the corresponding motivic spectra. Time permitting, we will summarize a strategy for computing slices of twisted K-theory spectra, generalizing a computation by Bruno Kahn and Marc Levine. This work is very much in progress, joint with Elden Elmanto and Denis Nardin.

Inna Zakharevich

Point counting to detect non-permutative elements of $K_1(\mathrm{Var})$

The Grothendieck ring of varieties is defined to be the free abelian group generated by varieties (over some base field k) modulo the relation that for a closed immersion $Y \longrightarrow X$ there is a relation that $[X] = [Y] + [X \setminus Y]$. This structure can be extended to produce a space whose connected components give the Grothendieck ring of varieties and whose higher homotopy groups represent other geometric invariants of varieties. This structure is compatible with many of the structures on varieties. In particular, if the base field k is finite for a variety X we can consider the "almost-finite" set $X(\bar{k})$, which represents the local zeta function of X. In this talk we will discuss how to detect interesting elements in $K_1(\mathrm{Var})$ (which is represented by piecewise automorphisms of varieties) using this zeta function and precise point counts on X.