

Talks

Speaker: Jakob Scholbach

Title: Towards a categorical Künneth formula for motives

Abstract: In various geometric situations, one can describe the category of sheaves on $X \times Y$ (a product of varieties over a field k) in terms of sheaves on X and sheaves on Y . Results of this form are referred to as categorical Künneth formulas. Eying applications in the function field Langlands program, we have established, in joint work with Hemo and Richarz (<https://arxiv.org/abs/2012.02853>) such a categorical Künneth formula for étale Weil sheaves. More recently (<https://arxiv.org/abs/2503.14416>), Richarz and I have proposed a conjecture concerning a categorical Künneth formula for motivic sheaves. In this talk I will present this circle of ideas, give evidence for the conjecture and report on recent results using the interplay between motives and non-commutative motives in order to further extend our knowledge regarding this conjecture.

Speaker: Robert Cass

Title: Motives in the Langlands program

Abstract: At its core the Langlands program seeks to parametrize the Galois extensions of a number field or function field, often revealing surprising connections between representation theory and arithmetic. Geometric methods have been spectacularly successful in the Langlands program, such as in the works of V. Lafforgue and Fargues-Scholze. I will describe my ongoing projects aimed at using motives to eliminate the dependence on a choice of cohomology theory in geometric approaches to the Langlands program, including an integral motivic version of geometric Satake and Gaiitsgory's central functor. This is joint work with Thibaud van den Hove and Jakob Scholbach.

Speaker: Tariq Syed

Title: On algebraic vector bundles of rank 2 over smooth affine fourfolds

Abstract: The classification of algebraic vector bundles of rank 2 over smooth affine fourfolds over algebraically closed fields is a notoriously difficult problem. In contrast to the situation in lower dimensions, rank 2 bundles over smooth affine fourfolds are no longer uniquely determined up to isomorphism by their Chern classes. In this talk, we use motivic homotopy theory to analyze the cohomological obstructions for the set of isomorphism classes of rank 2 bundles with prescribed Chern classes over a fixed smooth affine fourfold to be finite (resp. a singleton). This enables us in many cases to enumerate isomorphism classes of rank 2 bundles with prescribed Chern classes; we can even completely classify rank 2 bundles over some concrete smooth affine fourfolds. The talk is based on joint work with Thomas Brazelton and Morgan Opie.

Speaker: Paul Arne Østvær

Title: TBA

Abstract: TBA

Speaker: Charanya Ravi

Title: Localized Gysin maps

Abstract: In cohomology and Borel-Moore homology, Gysin maps and Euler classes are two fundamental operations that are important in intersection theory. In the standard setup, they

can be defined for quasi-smooth morphisms (e.g. lci morphisms) and vector bundles, respectively. In the equivariant setup, where there is an action of a diagonalisable group T (e.g. a split torus), it turns out that Gysin maps and Euler classes can be defined more generally. I will explain these constructions and some applications, including a virtual localization formula (generalizing the Graber-Pandharipande formula) and a virtual orbifold Riemann-Roch formula in the context of Deligne-Mumford stacks. This is based on joint work with Aranha–Khan–Latyntsev–Park and ongoing work with Khan.

Speaker: Frédéric Déglise

Title: Perverse homotopy t-structure and Rost-Schmid complexes

Abstract: I will report on an ongoing project in collaboration with Niels Feld and Fangzhou Jin, aimed at understanding Joseph Ayoub's perverse homotopy t-structure on mixed motives and motivic stable homotopy - suitably extended in a previous work with Bondarko to the case of schemes with dimension functions. According to a seminal conjecture of Ayoub formulated in the equicharacteristic case, the corresponding heart for relative motivic complexes should be equivalent to the category of Rost cycle modules.

With this conjecture in mind, we introduce a homological, relative, version of Milnor-Witt cycle modules, suitable for building generalized Rost-Schmid cycle complexes and linked with Rost's original definitions via a duality theory based on the notion of a « pinning ». This theory allows us to formulate, and prove over Dedekind domain, finiteness results of the associated cohomology theories, a generalized Bloch formula and deduce some new « absolute purity » results.

The next step is to reformulate Grothendieck's theory of Cousin resolutions internally to motivic homotopy categories, leading to a definition of Cohen-Macaulay motivic spectra and the associated Cousin-Gersten complexes. The final, and also technically the most demanding, step is to lift Gysin morphisms to the infinity-categorical level based on the notion of higher deformation spaces due to Mayeux and Dubouloz. This allows us to obtain several versions of Ayoub's conjecture, including a reformulation using the notion Cohen-Macaulay spectra.

Speaker: Denis-Charles Cisinski

Title: TBA

Abstract: TBA

Speaker: Tess Bouis

Title: Polylogarithms in p-adic Hodge theory

Abstract: Polylogarithms are analytic functions that appear naturally, by the work of Borel and Beilinson–Deligne, as classes of motivic origin in Deligne cohomology. Subsequent works of Coleman, Gros, Kato, Kurihara, and Soulé have then initiated the study of an analogous p-adic story, where the analogue of Deligne cohomology is given by syntomic cohomology. In this talk, I want to explain a new approach, based on prismatic and q-de Rham cohomologies, to express p-adic polylogarithms as syntomic Chern classes, leading in particular to integral refinements of the existing results. This is a joint work in progress with Quentin Gazda.

Speaker: Marc Hoyois

Title: Rational motivic cohomology

Abstract: Following Beilinson, one defines the rational motivic cohomology groups of a qcqs derived scheme as the eigenspaces of the Adams operations on the rational K-groups. It turns out that these groups can be promoted to a presheaf of \mathbb{Z} -graded E_∞ -ring spectra, which is characterized by a surprisingly simple universal property. This generalizes results of Morel and Cisinski-Dégliise about A^1 -invariant rational motivic cohomology.

Speaker: Katharina Hübner

Title: The tame fundamental group of a rigid space

Abstract: The étale fundamental group of an algebraic variety is not homotopy invariant nor topologically finitely generated when working in positive characteristic. In order to fix this issue the tame fundamental group has been introduced and thoroughly studied. And indeed the tame fundamental group has much better finiteness properties and moreover satisfies the Künneth formula making it homotopy invariant. In my talk I will present a joint project with Piotr Achinger, Marcin Lara, and Jakob Stix on the tame fundamental group of a rigid space. We proved finite generation and hope to establish the Künneth formula in the near future.

Speaker: Jens Eberhardt

Title: TBA

Abstract: TBA

Speaker: Arnaud Eteve

Title: Central functors and nearby cycles

Abstract: (This is based on joint work with D. Gaitsgory, A. Genestier and V. Lafforgue) Let G be a split reductive group, motivated by geometrization of the local Langlands correspondence, we constructed an algebraic version of Fargues-Scholze's spectral action. The key technical aspect is a careful study of certain nearby cycles over higher dimensional bases. Our construction turns out to be much more general and recovers (amongst other things) Gaitsgory's central functor and (geometric) local class field theory. I will give an overview of the construction and applications to a few examples.

Speaker: Jesse Pajwani

Title: Arithmetic of a higher Euler characteristic

Abstract: For k a field the A^1 Euler characteristic, constructed using motivic homotopy theory, furnishes a ring homomorphism $K_0(\text{Var}_k) \rightarrow \text{GW}(k)$, which both refines the classical Euler characteristic of a CW complex and contains arithmetic information. Recent work by Nanavaty and Röndigs show that this ring homomorphism lifts to a morphism of spectra from the K theory spectrum of varieties, $K(\text{Var}_k)$, to the endomorphisms of the motivic sphere spectrum over k . This in turn induces maps between higher homotopy groups of these spectra. In this talk, we study the induced morphism on the level of π_1 . We obtain an explicit description for this morphism, and relate it to an invariant coming from Hermitian K theory. This allows us to obtain new results about the structure of $K_1(\text{Var}_k)$. This is joint work with Ran Azouri, Stephen McKean and Anubhav Nanavaty.

Speaker: Marc Levine

Title: Localization and virtual localization in quadratic enumerative geometry

Abstract: We review classical torus localization (Edidin-Graham) and Graber-Pandharipande virtual localization, and then discuss the extension to localization and virtual localization for Witt sheaf cohomology, using the normalizer of the torus in SL_2

instead of \mathbb{G}_m . We give a few applications, such as the count of twisted cubics (w. Sabrina Pauli) and computations of real Donaldson-Thomas invariants by Anneloes Viergever (for P^3) and myself with Anneloes (for $(P^1)^3$).

Short talks

Speaker: Louisa Bröring

Title: Towards a quadratic Riemann-Hurwitz formula for geometrically cyclic branched coverings

Abstract: The \mathbb{A}^1 -Euler characteristic $\chi(X)$ of a smooth, projective scheme X over a field k of characteristic not two is a refinement of the topological Euler characteristic to quadratic forms, constructed using motivic homotopy theory. For example, if $k \subset \mathbb{R}$, then rank of $\chi(X)$ is equal to the topological Euler characteristic of $X(\mathbb{C})$ and the signature of $\chi(X)$ with respect to the given embedding is equal to the topological Euler characteristic of $X(\mathbb{R})$. The \mathbb{A}^1 -Euler characteristic plays an important role in the programme of \mathbb{A}^1 -refined enumerative geometry.

After briefly introducing the \mathbb{A}^1 -Euler characteristic, we present current work in progress on extending Levine's quadratic version of the Riemann-Hurwitz formula to geometrically cyclic branched coverings. An n -fold geometrically cyclic branched covering is a morphism $f: Y \rightarrow X$ between smooth, projective schemes together with a smooth, closed subscheme $Z \subset X$ satisfying the following condition: there exists a line bundle L over X and a section $s: X \rightarrow L^{\otimes n}$ such that Z is the zero locus of s and f is the pullback along s of the map $L \rightarrow L^{\otimes n}$ taking n -th powers. Our work includes some complete descriptions of the change of the \mathbb{A}^1 -Euler characteristic when n is odd and some explicit computations for coverings of \mathbb{P}^2 .

Finally, we will share some thoughts on how these methods might be used to compute the \mathbb{A}^1 -Euler characteristic of some K3 surfaces.

Speaker: Marius Leonhardt

Title: The affine Chabauty method

Abstract: Given a hyperbolic curve Y defined over the integers and a finite set of primes S , the set of S -integral points $Y(\mathbb{Z}_S)$ is finite by theorems of Siegel, Mahler, and Faltings. Determining this set in practice is a difficult problem for which no general method is known. In this talk I report on joint work in progress with Martin Lüdtkke in which we develop a Chabauty--Coleman method for finding S -integral points on affine curves. We achieve this by bounding the image of $Y(\mathbb{Z}_S)$ in the Mordell--Weil group of the generalised Jacobian using arithmetic intersection theory on a regular model.

Speaker: Keyao Peng

Title: Cellular A1-Homology of Smooth Toric Varieties

Abstract: In this talk, we explore the calculations of cellular A1-homology for smooth toric varieties, an analog of classic cellular homology. We provide an explicit description of pure shellable cases and discuss the derivation of the (Milnor-Witt) motivic decomposition for these cases, inspired by classic results in real toric manifolds. These findings offer new and

refined algebraic invariants for toric varieties, reflecting both their complex and real points. Additionally, we can present an additive basis for the Chow groups of general smooth toric varieties.

Speaker: Pietro Gigli

Title: The η -completed symplectic bordism ring

Abstract: The symplectic bordism spectrum $M\mathrm{Sp}$, constructed by Panin and Walter, represents the universal symplectically oriented cohomology theory, but its coefficient ring has no clear presentation. I will give a sketchy overview of what is known about the symplectic bordism ring. In particular, I will include a computation of the coefficient ring of the η -completed part $M\mathrm{Sp}^{\wedge}_{\eta}$, obtained through a modified version of the Pontryagin-Thom construction applied to varieties carrying a certain symplectic twist, which was part of my PhD thesis.

Speaker: Klaus Mattis

Title: Étale rigidity for motivic spaces

Abstract: 'Étale rigidity for motivic spectra' is the statement that (for certain base schemes S) any p -complete A^1 -invariant étale hypersheaf of spectra on Sm_S is 'small', i.e. comes from the small étale site S_{et} . This is a deep result proven by Bachmann, building on work of Suslin-Voevodsky, Ayoub, and Cisinski-Dégliise.

In this talk, I will explain how to generalize this rigidity result to the unstable setting: I will show that certain p -complete A^1 -invariant étale hypersheaves of anima are in fact coming from the small étale ∞ -topos.

If time permits, I will use this rigidity result to prove an étale version of Morel's theorem that strongly A^1 -invariant Nisnevich sheaves of abelian groups are strictly A^1 -invariant.

Speaker: Egor Zolotarev

Title: Slices of the special linear algebraic cobordism spectrum

Abstract: The talk is based on a joint work with Ahina Nandy and Oliver Röndigs.

The algebraic cobordism spectrum $M\mathrm{GL}$ was introduced at the dawn of motivic homotopy theory. A formula for the slices of this spectrum was conjectured by Vladimir Voevodsky and proved by Markus Spitzweck, assuming the Hopkins—Morel—Hoyois equivalence. The goal of this talk is to present an analogous computation for the special linear algebraic cobordism spectrum $M\mathrm{SL}$. If time permits, I will discuss the computation of the first homotopy modules of $M\mathrm{SL}$ via the very effective hermitian K -theory spectrum kq .

Speaker: Ran Azouri

Title: Motivic monodromy at an ordinary double point

Abstract: I will explain how to compute the motivic monodromy at a homogeneous singularity. Computing this for a quadratic singularity we get a refinement of the Picard-Lefschetz formula of Deligne, from étale to motivic cohomology. This is a joint work with Emil Jacobsen.

Speaker: Tianyi Feng

Title: Metaplectic Satake equivalence

Abstract: In this talk we explain the statement of the geometric Satake equivalence for topological (aka metaplectic) coverings of reductive groups.

Speaker: Thiago Landim

Title: Generalized Springer correspondence for Nori motives

Abstract: After the work of Ivorra-Morel and Terenzi, we finally have a six functor formalism for Nori motives. In this talk, I'll give a quick overview of its main properties and explain a proof of the generalized Springer decomposition in this context for rational coefficients. The proof is robust in the sense that it works in other contexts, and pinpoints the importance of cleanness.