Recent Trends in Algebraic Cycles, Algebraic K-Theory and Motives
Dernières tendances en cycles algébriques, K-théorie algébrique et motifs
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BEN ANTIEAU, UIC
Negative and homotopy K-theory of ring spectra and extensions of the theorem of the heart

Barwick proved that the K-theory of a stable infinity-category with a bounded t-structure agrees with the K-theory of its heart in non-negative degrees. Joint work with David Gepner and Jeremiah Heller extends this to an equivalence of nonconnective K-theory spectra when the heart satisfies certain finiteness conditions such as noetherianity. Applications to negative K-theory and homotopy K-theory of ring spectra are provided, which were the original motivation for our work.

NIKITA KARPENKO, University of Alberta
Chow ring of generic flag varieties

Let G be a split semisimple algebraic group over a field k and let X be the flag variety (i.e., the variety of Borel subgroups) of G twisted by a generic G-torsor. We study the conjecture that the canonical epimorphism of the Chow ring of X onto the associated graded ring of the topological filtration on the Grothendieck ring of X is an isomorphism. Since the topological filtration in this case is known to coincide with the computable gamma filtration, this conjecture indicates a way to compute the Chow ring.

MARC LEVINE, Universität Duisburg-Essen
Motivic Virtual Fundamental Classes

Let B be a reasonable base-scheme and Z a quasi-projective B-scheme. Relying on the Grothendieck 6-functor formalism for the motivic stable homotopy category, we define an object $C^{st}_{Z/B}$ in the motivic stable homotopy category $\mathsf{SH}(B)$, which we call the *intrinsic stable normal cone* of Z over B. For a motivic ring spectrum $\mathcal{E}$, we construct a fundamental class $[C^{st}_{Z/B}]_{\mathcal{E}}$ in $\mathcal{E}^{0,0}(C^{st}_{Z/B})$ and use this to construct for each perfect obstruction theory $\phi : E \to L_{Z/B}$ a virtual fundamental class $[Z,\phi]^{vir}_{\mathcal{E}} \in \mathcal{E}^{0,0}(\pi_{Z!}\Sigma^{E^\vee}1_Z)$. Here $\pi_Z : Z \to B$ is the structure morphism and we assume that B is affine. There are also G-equivariant versions of these constructions for G a "tame" algebraic group over B.

Taking $B = \mathrm{Spec}k$ and $\mathcal{E} = H\mathbb{Z}$, the spectrum representing motivic cohomology, we recover the definition of the fundamental class $[C_{Z/B}] \in \mathsf{CH}_0(C_{Z/B})$ of the intrinsic normal cone $C_{Z/B}$ of Z and the virtual fundamental class $[Z,\phi]^{vir} \in \mathsf{CH}_r(Z)$, $r = \mathrm{rank}E$, as defined by Behrend-Fantechi. Taking $\mathcal{E} = EM(K^{MW}_*)$, we get a virtual fundamental class $[Z,\phi]^{vir}_{K^{MW}_*} \in \tilde{\mathsf{CH}}_r(Z, \det^{-1}E)$, with $\tilde{\mathsf{CH}}$ the Chow-Witt theory of Barge-Morel and Fasel. In case $r = 0$, $\det E = \mathcal{O}_Z$, and Z projective over k, we can push this class forward to get a Grothendieck-Witt degree $\tilde{deg}[Z,\phi]^{vir}_{K^{MW}_*} \in \mathsf{GW}(k)$.

JOSE PABLO PELAEZ MENALDO, IMATE, UNAM
A triangulated approach to the the Bloch-Beilinson filtration

We will present an approach to the Bloch-Beilinson filtration in the context of Voevodsky's triangulated category of motives.

KYLE ORMSBY, Reed College
Vanishing in motivic stable stems

Recent work of Röndigs-Spitzweck-Østvær sharpens the connection between the slice and Novikov spectral sequences. Using classical vanishing lines for the E_2-page of the Adams-Novikov spectral sequence and the work of Andrews-Miller on the α_1-periodic ANSS, I will deduce some new vanishing theorems in the bigraded homotopy groups of the η-complete motivic sphere spectrum. In particular, I will show that the m-th η-complete Milnor-Witt stem is bounded above (by an explicit piecewise linear function) when $m \equiv 1$ or $2 \pmod 4$, and then lift this result to integral Milnor-Witt stems (where an additional constraint on m appears). This is joint work with Oliver Röndigs and Paul Arne Østvær.

DANIEL JUAN PINEDA, CCM-UNAM
On NIl groups of the quaternion group

We will describe the Nil groups of the ring $\mathbb{Z}Q_8$, the integral group ring of the quaternion group, we will give applications for the calculation of K theory groups of some infinite groups.

KIRSTEN WICKELGREN, Georgia Institute of Technology
Motivic Euler numbers and an arithmetic count of the lines on a cubic surface

A celebrated 19th century result of Cayley and Salmon is that a smooth cubic surface over the complex numbers contains exactly 27 lines. Over the real numbers, the number of lines depends on the surface, but work of Finashin-Kharlamov, Okonek-Teleman, and Segre shows that a certain signed count is always 3. We extend this count to an arbitrary field using A1-homotopy theory: we define an Euler number in the Grothendieck-Witt group for a relatively oriented algebraic vector bundle as a sum of local degrees, and then generalize the count of lines to a cubic surface over an arbitrary field. This is joint work with Jesse Leo Kass.

INNA ZAKHAREVICH, Cornell University
A derived zeta-function

Motivic measures can be thought of as homomorphisms out of the Grothendieck ring of varieties. Two well-known such measures are the Larsen–Lunts measure (over $\mathbf{C}$) and the Hasse–Weil zeta function (over a finite field). In this talk we will show how to lift the Hasse–Weil zeta function to a map of K-theory spectra which restricts to the usual zeta function on K_0. As an application we will show that the Grothendieck spectrum contains nontrivial elements in the higher homotopy groups.