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 $C^t_{Z/B}$ in the motivic stable homotopy category $SH(B)$, which we call the intrinsic stable normal cone of $Z$ over $B$. For a motivic ring spectrum $E$, we construct a fundamental class $[C^t_{Z/B}]_E$ in $E^{0,0}(C^t_{Z/B})$ and use this to construct for each perfect obstruction theory $\phi : E \to L_{Z/B}$ a virtual fundamental class $[Z,\phi]_{vir}^{vir} \in E^{0,0}(\pi_{Z!}\Sigma E^\vee 1_Z)$. 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 $B = \text{Spec} k$ and $E = HZ$, the spectrum representing motivic cohomology, we recover the definition of the fundamental class $[C_{Z/B}] \in CH_0(C_{Z/B})$ of the intrinsic normal cone $C_{Z/B}$ of $Z$ and the virtual fundamental class $[Z,\phi]_{vir}^{vir} \in CH_r(Z)$, $r = \text{rank} E$, as defined by Behrend-Fantechi. Taking $E = EM(K^MW)$, we get a virtual fundamental class $[Z,\phi]_{K^MW}^{vir} \in CH_r(Z, \det^{-1} E)$, with CH the Chow-Witt theory of Barge-Morel and Fasel. In case $r = 0$, $\det E = O_Z$, and $Z$ projective over $k$, we can push this class forward to get a Grothendieck-Witt degree $\tilde{deg}[Z,\phi]^{vir}_{K^MW} \in GW(k)$.

JOSE PABLO PELAEZ MENALDO, IMATE, UNAM

A triangulated approach to 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 $\alpha_1$-periodic ANSS, I will deduce some new vanishing theorems in the bigraded homotopy groups of the $\eta$-complete motivic sphere spectrum. In particular, I will show that the $m$-th $\eta$-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 $\mathbb{C}$) 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.