

ARTIG 2

Algebras and Representation Theory in Germany

Abstracts

Severin Barmeier (Universität zu Köln)

Hochschild cohomology and A_∞ deformations of extended Khovanov arc algebras

Extended Khovanov arc algebras are finite-dimensional Koszul algebras appearing at the confluence of representation theory, knot homology and symplectic geometry. I will show how to use quivers with relations to determine their A_∞ deformations. This settles a conjecture by Catharina Stroppel on the bigraded Hochschild cohomology of these algebras and produces explicit algebraic deformations of Fukaya-Seidel categories associated to Hilbert schemes of points on nilpotent slices of type A singularities. This talk is based on <https://arxiv.org/abs/2211.03354> joint with Zhengfang Wang.

Teresa Conde (Universität Stuttgart)

Exact Borel subalgebras of stratified algebras

Exact Borel subalgebras of standardly stratified algebras emulate the role of classic Borel subalgebras of complex semi-simple Lie algebras. Up to Morita equivalence, every standardly stratified algebra has an exact Borel subalgebra. By their recursive nature, standardly stratified algebras come equipped with a chain of standardly stratified quotient algebras (good quotients) and another chain of standardly stratified centraliser subalgebras (good subalgebras). In this talk, we will discuss properties of different types of exact Borel subalgebras and we shall see that these subalgebras are compatible, in more than one way, with good quotients and good subalgebras of standardly stratified algebras. This is based on joint work in progress with Julian Külshammer.

William Crawley-Boevey (Universität Bielefeld)

Integral representations of quivers

In the 1990s I classified rigid representations of a quiver by finitely generated free modules over a principal ideal ring. I shall extend the results to representations of a quiver by finitely generated projective modules over an arbitrary commutative ring.

Martin Kalck (Universität Freiburg)

Derived categories of singular projective varieties and finite dimensional algebras

We report on recent progress on describing derived categories of coherent sheaves on certain singular projective varieties in terms of derived categories of finite dimensional algebras. In particular, we obtain explicit tilting objects in some cases (including non-Gorenstein varieties) and describe parts of their endomorphism algebras in terms of quivers and relations.

As a consequence, we find new equivalences between singularity categories of finite dimensional algebras and certain isolated cyclic quotient singularities. This extends the singular equivalences for surfaces constructed in joint work with Karmazyn to higher dimensions. In the special case of Gorenstein singularities these singular equivalences have also been obtained by Hanihara using a different approach: namely, building on higher Auslander-Reiten theory and his joint work with Iyama on cluster categories.

This talk is based on ongoing joint works with Yujiro Kawamata & Nebojsa Pavic and with Carlo Klapproth & Nebojsa Pavic.

René Marczinzik (Universität Bonn)

Cohen-Macaulay Artin algebras

We show that contracted preprojective algebras of Dynkin type are Cohen-Macaulay Artin algebras. We use this class of algebras to answer a question of Auslander and Reiten. This is joint work with Aaron Chan and Osamu Iyama.

Amnon Neeman (Australian National University, Canberra / Universität Bielefeld)

Vanishing negative K-theory and bounded t-structures

We will begin with a quick reminder of algebraic K-theory, and a few classical, vanishing results for negative K-theory. The talk will then focus on a striking 2019 article by Antieau, Gepner and Heller - it turns out that there are K-theoretic obstructions to the existence of bounded t-structures.

The result suggests many questions. A few have already been answered, but many remain open. We will concentrate on the many possible directions for future research.

Leonardo Patimo (Universität Freiburg)

Charge, Atoms and Crystals in Representation Theory

The dimensions of the weight spaces of irreducible representations of reductive groups can be q-deformed, obtaining the Kostka-Foulkes polynomials, which measure the dimensions of the Brylinski-Kostant filtration and therefore have positive coefficients. Lascoux and Schützenberger gave in '78 a combinatorial interpretation of the coefficients of these polynomials in type A, known as charge. Finding such an interpretation for other groups is still an open problem.

We developed a new approach based on the geometry of the affine Grassmannian, where we construct the charge in terms of the associated crystal graph, starting from a decomposition of the crystal into atoms. This not only allows us to recover the results of Lascoux and Schützenberger in type A geometrically, but also to define (for the first time outside type A!) a charge in type C2 (joint with J. Torres).

Tashi Walde (Technische Universität München)

Mixed complexes of E_\bullet -algebras

There is a well known derived equivalence between the A_n -quiver and the A_n -quiver with zero relations. Seemingly unrelated, May's famous recognition theorem from the '70s identifies k-fold loop spaces with grouplike E_k -algebras.

We introduce the notion of a mixed complex of E_\bullet -algebras: such a gadget can be thought of as a non-additive chain complex A_\bullet , where each A_k is an E_k -algebra. We generalize May's recognition principle and identify grouplike complexes of E_\bullet -algebras with relative loop spaces of filtered objects. Our theorem specializes to the aforementioned derived equivalence of quivers when working in a stable setting (e.g. over a ring).

This talk is based on joint work in progress with G.Ginot and C.Scheimbauer.