Abstracts - Women in Representation Theory: Selfinjective Algebras and Beyond

Karin Erdman: Selfinjective algebras

The lectures will cover the following topics:

(1) What is special?
(2) Auslander-Reiten components: additive functions, detecting tree class.
(3) Classification results (and problems).
(4) Finite generation of Hochschild cohomology, support varieties of modules.
(5) Selfinjective algebras with radical cube zero.
(6) Homological conjectures.

Lidia Angeleri Hügel: Classification of tilting modules

Tilting modules occur in many contexts. It is rare, however, that one is able to classify them. The connection between tilting theory and localization can provide a new point of view on this problem. This is best illustrated by the example of a Dedekind domain R: the tilting modules over R are parametrized by the subsets of the spectrum Max$\mathrm{Spec}R$, or in other words, they correspond bijectively (up to equivalence) to the universal localizations of R, which in turn are in bijection with the recollements of the unbounded derived category of R. In my talk, I will present some recent results indicating that a similar classification can be achieved in a much more general context.

Janine Bastian: Derived equivalence classification of cluster-tilted algebras of type $\tilde{A}$

Cluster-tilted algebras arise as endomorphism algebras of cluster-tilting objects in a cluster category.

Since a cluster-tilted algebra A of type $\tilde{A}_n$ is finite dimensional over an algebraically closed field K, there exists a quiver Q which belongs to the mutation classes of $\tilde{A}_n$, and an admissible ideal I of the path algebra KQ such that $A \cong KQ/I$.

In this talk, we give an explicit description of the mutation classes of quivers of type $\tilde{A}_n$. Furthermore, we provide a complete classification of cluster-tilted algebras of type $\tilde{A}_n$ up to derived equivalence. We will see that this classification depends on four combinatorial parameters of the corresponding quiver Q.

Karin Baur: A frieze pattern determinant

Broline, Crow and Isaacs have computed the determinant of a matrix associated to a frieze pattern. In joint work with R. Marsh we generalise their result to the corresponding frieze pattern of cluster variables arising from a cluster algebra of type A. We give a representation-theoretic interpretation of this result in terms of configurations of indecomposable objects in the root category of type A.

Magdalena Boos: Parabolic orbits of 2-nilpotent matrices

Let $\mathcal{N}^{(2)}$ be the variety of 2-nilpotent complex $n \times n$-matrices and $\mathfrak{n}^{(2)}$ be the subvariety of upper-triangular such matrices. Each parabolic subgroup $\mathcal{P}$ of $\mathrm{GL}_n(\mathbb{C})$ acts on both varieties via conjugation. In case $\mathcal{P}$ equals the Borel subgroup of upper-triangular matrices, A. Melnikov classifies the orbits in $\mathfrak{n}^{(2)}$ via so-called link patterns and gives a description of their closures in terms of these.

In this talk, we provide a classification of the $\mathcal{P}$-orbits in $\mathcal{N}^{(2)}$ by working out the representation

theory of a finite-dimensional quiver-algebra. We will see that this classification naturally generalizes the above mentioned results and obtain a description of the orbit closures due to several results of G. Zwara.

Susanne Danz: Specht modules in the Auslander-Reiten quiver

Specht modules play an important role in the representation theory of the symmetric groups. Over fields of characteristic 0 they are precisely the simple symmetric-group modules; over fields of positive characteristic this is no longer true, and many basic questions about their structure are not answered. In this talk, I will discuss some homological properties of Specht modules over fields of positive characteristic p, by showing where Specht modules in wild p-blocks of small defect occur in the Auslander-Reiten quiver. This is joint work with Karin Erdmann.

Gabriella D'Este: Cancellations, additions and beyond

I will describe some more or less combinatorial results on modules, bimodules, complexes and dualities. A common feature of our constructions of tilting or cotilting - type objects is the big role played by a "cancellation strategy". A possible reason why sometimes also the simplest structures may provide useful information could be the fact that some mathematical objects have more than one aspect (discrete & continuous, combinatorial & topological and so on).

Lingyan Guo: Generalized higher cluster categories

We will first construct generalized higher cluster categories which are Hom-finite and have higher Calabi-Yau dimension and higher cluster tilting objects. Then as applications, we consider such categories arising from Ginzburg dg categories of graded quivers with superpotential and from finite-dimensional algebras of finite global dimension. This is a generalization of Claire Amiots work for generalized cluster categories.

Anja Hutschenreuter: Is the RSK-Algorithm Canonical?

The Robinson-Schensted-Knuth correspondence describes a bijection between matrices with non-negative integers entries and pairs of semistandard Young Tableaux of the same shape. The algorithm describing this correspondence is by no means obvious. The question which motivated this work was whether the RSK-Algorithm is canonical from the point of view of representation theory. We realize the RSK correspondence as a correspondence between two parametrizations of the crystal basis of the algebra of quantum matrices. The main technical point is to prove the compatibility of Kashiwara operators with the RSK correspondence.

Magdalini Lada: Mutation of Auslander generators

Let Λ be an artin algebra with representation dimension equal to three and M an Auslander generator of Λ. We show how, under certain assumptions, we can mutate M to get a new Auslander generator whose endomorphism ring is derived equivalent to the endomorphism ring of M. We apply our results to self-injective algebras with radical cube zero of infinite representation type, where we construct an infinite set of Auslander generators.

Lisa Lamberti: A geometric interpretation of the triangulated structure of m-cluster categories

Cluster categories and m-cluster categories can be described via diagonals and m-diagonals in a polygon. They are linked to each other by a combinatorial procedure. In this talk we explain how the triangulated structure can be described in type A on the level of the geometric model and how it is afftected by the combinatorial procedure.

Anna-Louise Paasch: A monoid of projection functors

We study the monoid generated by projection functors Π_S onto subcategories $\mathrm{Ker}\left(\mathrm{Hom}_{KQ}\left(S, \_\right)\right)$ for simple representations S of a quiver Q. We show for Q of linearly oriented type A_n that the resulting monoid has C_{n+1} (the Catalan number) elements and its monoid algebra is a quotient of a Hecke algebra. Furthermore it is isomorphic to a certain incidence algebra. We also glance at some other "simply shaped" quivers.

Daiva Pucinskaite: Quasi-hereditary algebras via bases of local, self-injective algebras

Julia Sauter: On irreducible components of Dynkin quiver flag varieties

In this talk we introduce quiver flag varieties and describe a tangent space method to detect irreducible components of Dynkin quiver flag varieties. This question is motivated by developing quiver-graded Springer theory further, which has been started by Reineke in analogy to the classical case.

Alexandra Zvonareva: Autoequivalences of stable categories of self-injective algebras of finite representation type

We study mesh categories and stable Auslander-Reiten quivers of self-injective algebras of finite representation type. They are classified in the work of C. Riedtmann. With the help of this classification we compute all groups of autoequivalences of stable categories of self-injective algebras of finite representation type. In a similar fashion we compute the groups of stable autoequivalenses modulo natural transformations.