hausdorff CENTER FOR MATHEMATICS

UNIVERSITÄT BONN

Workshop

"ARTIG 5 - Algebras and Representation Theory in Germany"

February 14-15, 2025

organized by
Henning Krause, Rene Marczinzik, Jan Schröer

Abstracts

Markus Reineke (Ruhr-Universität Bochum)

Expander representations

Abstract: We discuss a definition of expander representations of quivers, generalizing dimension expanders, as a qualitative refinement of slope stability. The main result is existence of uniform expander representations for any wild quiver over an algebraically closed base field.

Rene Marczinzik (University of Bonn)

Auslander regular algebras and Coxeter matrices

Abstract: We give a survey on Auslander regular algebras and discuss new characterisations and classification results for this class of algebras.

Karin Erdmann (University of Oxford)

Cluster tilting modules for weighted surface algebras

Abstract: Symmetric algebras for which all modules are Ω-periodic can have cluster tilting modules, by [EH]. We describe a method which produces self-orthogonal modules for weighted surface algebras (as introduced in [ES]). We show that in many cases, these extend to 3-cluster tilting modules. [EH] K. Erdmann, T. Holm, Maximal n-orthogonal modules for self-injective algebras, Proc. A.M.S. 136(2008), 3069-3078. [ES] K. Erdmann, A. Skowro´nski, Weighted surface algebras: general version, J. Algebra 544(2020), 170-227, corrigendum J. Algebra 569(2021), 875-889.

Olivier Schiffmann (Université de Paris-Saclay)

The Coxeter complex, Langlands formula and perverse sheaves on h/W

Abstract: Induction and restriction functors arise in many contexts of representation theory. A famous and useful trick going back (at least) to Zelevinsky is to consider all the groups $\mathrm{GL}_n togetheranduseinductiona$

This is joint work with M. Kapranov, V. Schechtman and J. Yuan.

Lidia Angeleri Hügel (Università degli Studi di Verona)

Mutation via the Ziegler spectrum

Abstract: The lattice of torsion pairs//torsA in the category of finite dimensional modules over a finite dimensional algebra A can be studied in terms of mutation of associated cosilting complexes in the unbounded derived category D(ModA) of the category of all A-modules. These cosilting complexes are pure-injective, and they correspond bijectively to maximal rigid sets in the Ziegler spectrum Zg(D(A)) of D(ModA). In this talk, we will describe mutation as an operation that exchanges elements in certain closed subsets of Zg(D(A)). This will allow us to interpret properties of torsA in terms of topological conditions on Zg(D(A)).
The talk will be based on joint work with Rosanna Laking and Francesco Sentieri.

Monica Garcia (Université du Québec à Montréal)

Semistability and projective presentations

Abstract: Stability conditions are an important tool in algebraic theory for constructing moduli varieties. When applied to the varieties of modules over a finite-dimensional algebra, they give rise to the algebraic notion of semistable modules, which are closely linked to *tau*-tilting theory and cluster algebras. To find these semistable modules, one can compute a special class of regular functions known as determinantal semi-invariants. In this talk, we will revisit the relation of these semi-invariants to projective presentations and explore semistability for varieties of projective presentations. We will recall that determinantal semi-invariants give rise to two interesting types of subcategories, namely, wide subcategories of the module category and thick subcategories of the extriangulated category of projective presentations. Finally, we will introduce an extriangulated version of the correspondences among support *tau*-tilting objects, torsion classes, and wide subcategories. This correspondence extends classical results to the context of projective presentations.

William Crawley-Boevey (Bielefeld University)

Clannish algebras with idempotent loops

Abstract: This is a report on ongoing work with R. Bennett-Tennenhaus. I will explain the notion of a clannish algebra, a generalization of string algebras introduced by the speaker in 1989. They include the Gelfand problem arising from Harish-Chandra modules for SL(2,R) and skew-gentle algebras. Clannish algebras are given by quivers with non-admissible relations, allowing some loops in the quiver, called special loops, to be bound by quadratic polynomials. More generally we have introduced "semilinear clannish algebras" in which one considers representations of the quiver by maps which are semilinear with respect to an automorphism of the underlying field or division ring. I will discuss a systematic classification of the indecomposable representations of (semilinear) clannish algebras. In the original work, the quadratic polynomials must have non-zero constant term. Work by Hansper shows that the classification also holds if the polynomials are all of the form $x^2 - x$, so that the special loops are represented by idempotent endomorphisms. The work with R. Bennett-Tennenhaus aims to prove that the classification works in general.
