ARTIG 3 – Abstracts

Representation theory of non-commutative Gorenstein rings in dimension one

Osamu Iyama

University of Tokyo

We apply tilting theory to study Cohen-Macaulay representations over (possibly non-commutative) Gorenstein rings, as in the commutative case studied with Buchweitz and Yamaura. The main object of this talk is Artin-Schelter Gorenstein algebras A of dimension one, including classical Gorenstein orders. As usual, the stable category of $\mathbb{Z}$-graded Cohen-Macaulay modules over A is equivalent to the $\mathbb{Z}$-graded singularity category of A. We prove that the generically projective $\mathbb{Z}$-graded singularity category of A always admits an (explicitly described) silting object, and admits a tilting object if and only if either A is regular or the average Gorenstein parameter p of A is non-positive. Here the degree zero part of A has several simple modules in general, and p is the average of their Gorenstein parameters. We explain our results by giving some examples. This is a joint work with Yuta Kimura and Kenta Ueyama.

Extending the brick/τ-rigid correspondence

Rosanna Laking

Università degli Studi di Verona

In their work on τ-tilting finite algebras, bricks and g-vectors, Demonet, Iyama and Jasso showed that, over a finite-dimensional algebra, there is a bijection between indecomposable τ-rigid objects and "functorially-finite" bricks. In this talk we will present joint work with Lidia Angeleri Hügel and Francesco Sentieri in which we reframe (and dualise) this bijection in order to obtain a correspondence between bricks and suitable generalised versions of τ^{-1}-rigid modules. In particular, these generalised τ^{-1}-rigid modules are no longer necessarily finite-dimensional.

Weighted projective lines revisited

Andrew Hubery

Bielefeld University

Weighted projective lines were introduced by W. Geigle and H. Lenzing in 1985 in order to apply geometric techniques to the study of Ringel's canonical algebras, extending earlier ideas of Lenzing used in the study of tame hereditary algebras. The category of coherent sheaves on such a weighted projective line shares many properties with the category of coherent sheaves on a smooth projective curve: it is noetherian, has global dimension one, admits a Serre functor, and in (virtual) genus one there is a classification of the indecomposable torsion-free sheaves analogous to Atiyah's classification for elliptic curves.

Following a remark by Lenzing, we offer a new approach to sheaves on weighted projective lines via periodic functors to sheaves on the usual projective line. This has several advantages, allowing the construction of a standard resolution of a sheaf, and then an explicit description of Serre duality in terms of Serre duality on the projective line. It is also more flexible, in that we can work over arbitrary fields, and thus construct more general (non-simply laced) weighted projective lines, but still just in terms of sheaves on the usual projective line. If time permits, we will also discuss extensions of this theory to sheaves equipped with a connection, and their application to the Deligne-Simpson Problem.

Weighted projective lines and the tubular world

Dirk Kussin

Technische Universität Berlin

We give a short overview of the weighted projective lines, invented by Geigle-Lenzing, and their various incarnations. Then we look at the broader noncommutative context and focus on the particularly fascinating case of (orbifold) Euler characteristic zero, in particular, over the field of real numbers, where full classifications are possible and much more thrilling than over the complex numbers. If time permits we will also briefly exhibit some newer insights into the exactly definable category of (quasicoherent) sheaves of a fixed irrational slope, and its Ziegler spectrum.

Singularities, Representations of Algebras, and Vector Bundles

Duco van Straten

University Mainz

In 1985 a conference with the above title took place in Lambrecht, organised by G.-M. Greuel and G. Trautmann. It brought together experts (and non-experts!) from the three areas appearing in the title, with the aim to learn more from each other about the interrelations between the topics that were being discovered at the time. I will sketch out some aspects of the work of Lenzing that emerged from the mirror symmetry phenomenon.

9:00 - 10:00

Auslander's Formula for stable ∞-categories, after Klemenc

Gustavo Jasso

Lund University

Auslander's Formula is a presentation of a given abelian category as the quotient of its category of finitely-presented functors by its Serre subcategory of effaceable functors. The purpose of this talk is to explain, using results of Lurie, a variant of this formula in the context of stable ∞-categories that generalises Krause's Derived Auslander Formula for the bounded derived category of an abelian category. If time permits, I will also explain how this formula can be seen as a special case of Klemenc's construction of the stable hull of an exact ∞-category in the sense of Barwick.

10:30 - 11:30

Reduction of Frobenius extriangulated categories and friezes

Eleonore Faber

University of Leeds

Iyama and Yoshino introduced a reduction technique for 2-Calabi-Yau triangulated categories in their 2008 paper. This produces a new 2-Calabi-Yau triangulated category as a subquotient of the original category in a way that works particularly nicely for cluster categories. We give a reduction technique that applies to stably 2-Calabi-Yau Frobenius extriangulated categories. As an application, we show that this provides a categorical model for the reduction of so-called Conway-Coxeter frieze patterns to frieze patterns with coefficients in the sense of Cuntz, Holm, and Jørgensen. This is joint work with Bethany Marsh and Matthew Pressland.

12:00 - 13:00

HMS symmetries (and their decategorification) for toric boundary divisors

Michel Van den Bergh

University of Hasselt

We survey some results on the action of fundamental groups on derived categories. We will in particular evoke some results from our joint work with Špela Špenko.