

Conference in memoriam of Dieter Happel, TU Chemnitz, 3–4 May 2013

All lectures will be held in Lecture Hall N113 on the upper floor of the "Zentrales Hörsaal- und Seminargebäude" at the southern end of the campus area on Reichenhainer Straße.

Friday, 3 May 2013

Programme

- 9:00–10:00 Idun Reiten (Trondheim): *My work with Dieter*
- 10:15–11:15 Karin Erdmann (Oxford): *Hochschild cohomology and representation theory*
Coffee break
- 11:45–12:45 Dan Zacharia (Syracuse): *On rigid sheaves on the projective space*
Lunch break
- 14:30–15:30 Pu Zhang (Shanghai): *From CM finite to CM free*
Coffee break
- 16:00–17:00 Claus Michael Ringel (Bielefeld): *The early years of tilting theory. 1980–1985.*

Abstracts

Karin Erdmann (Oxford): *Hochschild cohomology and representation theory*

Dieter Happel's work on Hochschild cohomology has made a huge impact, for exploiting it for representation theory. This lecture aims to discuss some of this.

Idun Reiten (Trondheim): *My work with Dieter*

In this talk I will discuss my joint work with Dieter Happel (some of it with additional coauthors, mainly Sverre Smalø, and also Bernhard Keller). Hence the topics will be short cycles, quasitilted algebras, piecewise hereditary algebras, tilting with respect to torsion pairs, hereditary categories with tilting objects and bounded derived categories and repetitive algebras.

Claus Michael Ringel (Bielefeld): *The early years of tilting theory. 1980–1985.*

Tilting theory provides an effective method for constructing module categories with strong similarities, it is now an indispensable tool in algebra and geometry. The basic features and the relevance of tilting modules and tilting functors will be outlined in the lecture. The period 1980–1985 which we will consider is bounded by the PhD-thesis and the habilitation thesis of Dieter Happel, both investigations are milestones in the development of tilting theory.

Dan Zacharia (Syracuse): *On rigid sheaves on the projective space*

I will talk about joint work with Dieter Happel where we attempted to analyze some problems about coherent sheaves on the projective space by translating these problem into problems involving representations of finite dimensional algebras. I will mention two of the problems we looked at. One of them is about the structure of the endomorphism ring of an indecomposable coherent sheaf, and the other one is about the location of the coherent sheaves in the Auslander-Reiten quiver of the derived category of coherent sheaves.

Pu Zhang (Shanghai): *From CM finite to CM free*

Given a non-semisimple representation-finite algebra, the Auslander algebra has global dimension 2. Dieter Happel once mentioned that this is a kind of resolution of singularities. In this talk we borrow and develop his idea. Given a CM finite algebra A (i.e. A has only finitely many indecomposable Gorenstein-projective modules, whether A is Gorenstein or not), the corresponding relative Auslander algebra $\text{Aus}(A)$ is CM free (i.e. Gorenstein-projective $\text{Aus}(A)$ -modules are exactly projective). Thus, considering the Buchweitz-Happel theorem, roughly speaking, an algebra of finite singularities becomes an algebra without singularities after taking the Auslander algebra. Given a CM finite algebra A , the singularity category of A is triangle-equivalent to the Gorenstein defect category of $\text{Aus}(A)$. Here the Gorenstein defect category is in the sense of P. A. Bergh, D. A. Jorgensen, and S. Oppermann. The two results presented above are joint work with Fan Kong.

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Saturday, 4 May 2013

Programme

- 9:00–10:00 Lidia Angeleri Hügel (Verona): *Large tilting sheaves on exceptional curves*
- 10:15–11:15 Andrew Hubery (Leeds, Bielefeld): *The simplicial complex of cluster-tilting objects is connected*
Coffee break
- 11:45–12:45 Pierre-Guy Plamondon (Paris): *Quiver varieties and repetitive algebras*
Lunch break
- 14:30–15:30 Kota Yamaura (Nagoya): *Construction of a natural t-structure on the stable category of graded modules over a positively graded self-injective algebra*
Coffee break
- 16:00–17:00 Bernhard Keller (Paris): *Projectives in all meshes*

Abstracts

Lidia Angeleri Hügel (Verona): *Large tilting sheaves on exceptional curves*

We consider the category $\text{Qcoh } X$ of quasi-coherent sheaves on a weighted projective line, or more generally (when the ground field is not algebraically closed), on an exceptional curve X . The localizations of $\text{Qcoh } X$ at sets of finite length objects are related to tilting sheaves on X that are not coherent. We give a complete classification of the non-coherent tilting sheaves on X when X is of domestic or of tubular type. Moreover, we discuss the connection with the infinite dimensional tilting modules over the derived equivalent canonical algebra. This is joint work with Dirk Kussin.

Andrew Hubery (Leeds, Bielefeld): *The simplicial complex of cluster-tilting objects is connected*

By work of Happel, Ringel, Unger and others it was shown that the set of basic rigid modules for an hereditary artin algebra has a natural structure of a simplicial complex. We will show how to extend this result to prove that this complex has a natural completion which is an abstract simplicial polytope. In particular, this implies that the cluster-tilting objects in the corresponding cluster category form a single mutation class.

Bernhard Keller (Paris): *Projectives in all meshes*

Inspired by the work of Hernandez-Leclerc and Leclerc-Plamondon on graded quiver varieties we give a new description of the derived category of a Dynkin quiver in terms of the representations of a certain (weakly) Gorenstein algebra. This is a Gorenstein analogue of Happel's classical description of the derived category in terms of representations of the repetitive algebra. This is joint work with Sarah Scherotzke.

Pierre-Guy Plamondon (Paris): *Quiver varieties and repetitive algebras*

We will show how some of the quiver varieties of Nakajima can be interpreted as varieties of representations of repetitive algebras. This description will rely on Happel's result relating the category of representation of repetitive algebras and derived categories. This is joint work with Bernard Leclerc.

Kota Yamaura (Nagoya): *Construction of a natural t-structure on the stable category of graded modules over a positively graded self-injective algebra*

Dieter Happel had studied relationships between the derived category of a given algebra and the stable category of modules over the trivial extension. First he realized the module category of the original algebra as a heart of a t-structure on the stable category. Secondly he showed that the derived category can be embedded in the stable category. In my talk, I give some generalization of these works of D. Happel.