Workshop on Representation Theory of Algebras

December 2-4, 2016, AU/USTC, Hefei

**December 3 (Saturday)**

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| **Time** | **Talk** |
| 9:00-9:50 | Zhaoyong Huang |
| 10:00-10:50 | Zhe Han |
| 10:50-11:10 | Coffee Break  |
| 11:10-12:00 | Nan Gao |
| 12:00-14:00 | Lunch Break |
| 14:00-14:50 | Hongxing Chen |
| 15:00-15:50 | Chao Zhang |
| 15:50-16:10 | Coffee Break  |
| 16:10-17:00 | Lingling Yao |

**December 4 (Sunday)**

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| **Time** | **Talk** |
| 9:00-9:50 | Zhi-Wei Li |
| 10:00-10:50 | Xiaojin Zhang |
| 10:50-11:10 | Coffee Break  |
| 11:10-12:00 | Claus Michael Ringel |
| 11:20-14:00 | Lunch Break |

Session Chairs: Dec. 2 Morning C.M. Ringel /Afternoon Z. Huang

 Dec. 3 Morning P. Zhang

Lecture Room: 1518, the math building, USTC

Sponsors: School of Mathematical Sciences, Anhui University and University of Science and Technology of China

Organizers: Yanhong Bao, Xiao-Wu Chen, Jue Le, Yu Ye, Zhibin Zhao

**Abstracts**

**Hongxing Chen, Counterpart of higher representation dimension.**

Abstract: Representation dimension, as a target function on the endomorphism algebras of generator-cogenerators over an algebra,takes the infimum of their global dimensions. Higher versions of representation dimension append restriction on dominant dimensions of these algebras. A natural modification of the above target function, called cf dimension, shall be introduced in this talk. It takes the supremum of dominant dimensions of those endomorphism algebras which have finite global dimension. In contrast to representation dimension, measuring how far an algebra to be of finite representation type, cf dimension seems to measure the quality of noncommutative crepant resolutions and quasi-hereditary covers. Related to this dimension,some basic properties, such as finiteness, invariance under stable equivalences and the connection to Hochschild cohomology algebras, are stated.

**Nan Gao, Infinite ladder induced by preprojective algebras**

Abstract: In this paper we characterize when a recollement of compactly generated triangulated categories admits a ladder of some height going either upwards or downwards. As an application, we show that the derived category of the preprojective algebra of Dynkin type $\mathbb{A}\_n$ admits a periodic infinite ladder whose one outer term is the derived category of a differential graded algebra. This is a joint work with Chrysostomos Psaroudakis.

**Zhaoyong Huang, Minimal right determiner of irreducible morphisms in algebras of type A\_n**

Abstract：Let Λ be a ﬁnite dimensional algebra of type A\_n over an algebraically closed ﬁeld K with the quiver Q and let |Det(Λ)| be the number of the minimal right determiners of all irreducible morphisms between indecomposable left Λ-modules. If Λ is a path algebra, then we have |Det(Λ)| = 2n−2, if p = 0; 2n−1−p, if p ≥ 1, where p = |{i | i is a source in Q with 2 ≤ i ≤ n−1}|.

 If Λ is a bound quiver algebra, then we have |Det(Λ)| = 2n−2, if r = 1; 2n−p−q−1, if r ≥ 2, where q is the number of non-zero sink ideals of Λ and r = |{i | i is a sink in Q with 1 ≤ i ≤ n}|. This is a joint work with Xiaoxing Wu.

**Zhi-Wei Li, The pretriangulated subfactors of additive categories with suspensions**

Abstract: We give a framework to construct pretriangulated structures of some subfactor categories of additive categories with suspensions. Here a pretriangulated structure consists of a left and a right triangulated structure satisfying some compatible conditions. One application is that we can realize the homotopy category of an exact model structure as a subfactor as pretriangulated categories.

**Claus Michael Ringel, The Kronecker modules**

Abstract: The representations of a Kronecker quiver as well the corresponding graded representations (these are the representations of the n-regular tree with bipartite orientation) play an important role in many parts of mathematics. The case n = 2 was studied by Weierstrass and Kronecker, later also by G.D. Birkhoff, Hilbert and Grothendieck, and seems to be well-understood. But for the wild cases n \ge 3, not much is known. In the lecture we will survey some recent results concerning the wild cases. In particular, we want to shed some light on the structure of the Auslander-Reiten orbits of the regular representations.

**Lingling Yao, The Jordan-Holder theorem for derived module categories of derived discrete algebras**

Abstract: The Jordan-Holder theorem is established for derived module categories of finite dimensional derived discrete algebras of finite global dimension using an equivalent definition of derived discrete algebras.

**Chao Zhang, On cohomological width and cohomological length**

Abstract: In this talk, we will introduce some results on the cohomological width and cohomological length of the indecomposable objects in the bounded derived category of artin algebras: (1) using the construction of indecomposable objects in the triangulated category due to Happel and Zacharia, we establish that the global cohomological width shares the same value with strong global dimension; (2) an upper bound of global cohomological width for piecewise hereditary algebras is obtained. As an application, we construct finite-dimensional piecewise hereditary algebras of type A and D with global cohomological width arbitrary positive integer m; (3) we prove the "no-gaps" theorem of cohomological length for gentle algebras over algebraically closed fields.

**Xiaojin Zhang, Tilting modules over Auslander's n-Gorenstein algebras**

Abstract: For an Auslander's n-Gorenstein algebra Λ for n ≥ 1, we construct a tilting module with projective dimension n which is a minimal element in the set T\_n of isomorphism classes of basic tilting modules with projective dimension at most n. As a result, we give equivalent conditions for an Auslander's k-Gorenstein algebra to be Iwanaga-Gorenstein. Moreover, for an Auslander's 1-Gorenstein algebra Λ and its factor algebra Λ = Λ/(e), we show that there is a bijection between the set tiltΛ of isomorphism classes of basic classical tilting Λ-modules and the set sttiltΛ of isomorphism classes of basic support τ-tilting Λ-modules, where e is an idempotent such that eΛ is a basic additive generator of projectiveinjective Λ-modules. This is a joint work with Osamu Iyama.

**Zhe Han, Reflection functors and tilting torsion classes**

Abstract: We will recall some facts about the classical tiling modules. Hughes and Waschbuech introduces a reflection associated with the quiver of a given algebra. In this talk, we will realize the reflection by tilting torsion class introduced by Happel, Reiten and Samlo. Finally, we will show some examples about the results. This is an ongoing joint work with Xiao-Wu Chen.