

Mini-Workshop on Algebras

March 10-11, 2025, USTC, Hefei

March 10 (Monday)

Time	Chair	Talk
14:30-14:55	吴燚林	汪任（合肥工业大学）
15:00-15:25		胡海刚（中国科学技术大学）
15:25-15:40		Break + Group Photo
15:40-16:05		戴函（中国科学技术大学）
16:10-16:35		曹培根（中国科学技术大学）
16:35-16:50		Break
16:50-17:40		杜杰（University of New South Wales）
18:00-20:00		Dinner

Lecture Room: 第五教学楼 5407

组织者：陈小发，陈小伍，王凯，叶郁

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Abstracts

Modules determined by their Newton polytopes

曹培根 (中国科学技术大学)

Abstract: In the τ -tilting theory, there exist two classes of fundamental modules: indecomposable τ -rigid modules and left finite bricks. We prove that the indecomposable τ -rigid modules and the left finite bricks are uniquely determined by their Newton polytopes spanned by the dimensional vectors of their quotient modules. This is a kind of generalization of Gabriel's result that the indecomposable modules over path algebras of Dynkin quivers are uniquely determined by their dimensional vectors.

Maximal highest weight modules in category $\mathcal{O}$ for Yangian $Y(\mathfrak{g})$

戴函 (中国科学技术大学)

Abstract: Let $\mathfrak{g}$ be a finite-dimensional simple Lie algebra over $\mathbb{C}$. We investigate a class of maximal highest weight modules in category $\mathcal{O}$ for Yangian $Y(\mathfrak{g})$. We explore the tensor product structure and simplicity criteria for these modules. Furthermore, we establish necessary and sufficient conditions under which such modules are isomorphic to evaluation modules.

Constructing the quantum queer supergroup using Hecke–Clifford superalgebras

杜杰 (University of New South Wales)

Abstract: Using a geometric setting of q -Schur algebras, Beilinson–Lusztig–MacPherson discovered a new basis for quantum $\mathfrak{gl}_n$ (i.e., the quantum enveloping algebra $U_q(\mathfrak{gl}_n)$ of the Lie algebra $\mathfrak{gl}_n$) and its associated matrix representation of the regular module of $U_q(\mathfrak{gl}_n)$. This beautiful work shows that the structure of the quantum linear group is hidden in the structure of Hecke algebras. The work has been generalized (either geometrically or algebraically) to quantum affine $\mathfrak{gl}_n$, quantum super $\mathfrak{gl}_{m|n}$, and recently, to some $\imath$ -quantum groups of type AIII. In this talk, I will report on a completion of the work for a new construction of the quantum queer supergroup using Hecke–Clifford superalgebras and their associated q -Schur superalgebras.

Locally gentle maps

胡海刚 (中国科学技术大学)

Abstract: We introduce the concept of locally gentle maps $\mathcal{A} = (D, \zeta, \alpha, \iota)$ which is a natural generalization of rooted combinatorial maps. We show that there is a one-to-one correspondence

$$\{\text{locally gentle maps}\} / \cong \xleftrightarrow{1:1} \{\text{locally gentle quivers}\} / \cong .$$

This correspondence associates to each locally gentle map $\mathcal{A}$ a locally gentle algebra A , and vice verse. We then show how to use $\mathcal{A}$ to calculate the global dimension and the Koszul dual of A . If time permits, we will also give a formula for constructing the “partially-marked” ribbon surfaces associated to locally gentle algebras via their corresponding maps. This talk is based on a joint work with Xiao-Chuang Wang and Yu Ye (USTC).

Skew group categories, algebras associated to Cartan matrices and folding of root lattices

汪任 (合肥工业大学)

Abstract: The folding of root lattices is fundamental in Lie theory when getting from the simply-laced cases to the non-simply-laced cases. Following Gabriel and Geiss-Leclerc-Schröer, the relevant root lattices are categorified by certain module categories. We construct a certain functor between the module categories, which is a categorification of the folding projection. The main tools are skew group categories and finite EI categories of Cartan type. This is joint work with Xiao-Wu Chen.