THE UNIVERSITY



OF HONG KONG

Institute of Mathematical Research Department of Mathematics

Algebra Forum

December 4 - 5, 2008 Room 517, Meng Wah Complex, HKU

Programme

Thursday, December 4

9:50	Opening Remarks TSANG Kai-Man, Head, Department of Mathematics, The University of Hong Kong
10:00 - 10:50	On Classification of Quantum Groups Efim ZELMANOV, University of California at San Diego and The University of Hong Kong
Tea Break	
11:10 - 12:00	Block Coverings in Finite Groups ZHANG Jiping , <i>Beijing University</i>
Lunch Break	
14:30 - 15:20	Infinite Dimensional Algebras Lance SMALL, University of California, San Diego
15:30 - 16:20	Noncommutative Castelnuovo-Mumford Regularity and AS-regular Algebras WU Quanshui , Fudan University
Tea Break	
16:40 - 17:30	Green's Formula with C*-action and Caldero-Keller's Formula for Cluster Algebras XIAO Jie , <i>Tsinghua University</i>
18:00	Conference Dinner

Friday, December 5

10:00 - 10:50	The Unique Embedding and Tietze Transformation YU Jie-Tai , The University of Hong Kong	
Tea Break		
11:10 - 12:00	Cohomology of Affine Hecke Algberas of Type A XI Changchang , <i>Beijing Normal University</i>	
12:10	Closing Remarks MOK Ngaiming, Director, Institute of Mathematical Research, The University of Hong Kong	

Abstracts

Infinite Dimensional Algebras Lance SMALL, University of California, San Diego

We will talk about recent results concerning enveloping algebras of the Witt algebra. Various open problems will also be discussed.

Noncommutative Castelnuovo-Mumford Regularity and AS-regular Algebras WU Quanshui, *Fudan University*

Let A be a connected graded k-algebra generated in degree 1, with a balanced dualizing complex. I will talk about the Castelnuovo-Mumford regularity and the Ext-regularity and prove that these regular theorities coincide for all finitely generated A-modules if and only if that A is a Koszul ASregular algebra. By using Castelnuovo-Mumford regularity, we also prove that any Koszul standard AS-Gorenstein algebra is AS-regular.

Cohomology of Affine Hecke Algberas of Type A XI Changchang, *Beijing Normal University*

In this talk, we shall consider the cohomological global dimension of the affine Hecke algebras $H_n(q)$ of type A, and show that if the characteristic of the ground field is zero and the Poincare polynomial does not vanish at the quantum parameter q, then the affine Hecke algebra of type A has finite global dimension. The proof of this result is based on development of affine cellular algebras, which are introduced recently.

This is a joint work with Steffen Koenig.

Green's Formula with C*-action and Caldero-Keller's Formula for Cluster Clgebras XIAO Jie, *Tsinghua University*

It is known that Green's formula over finite felds gives rise to the multiplications of Ringel-Hall algebras and quantum groups (see [Green], also see [Lusztig]). In this talk, we deduce the projective version of Green's formula in a geometric way. Then following the method of Hubery in [Hubery2005], we apply this formula to prove Caldero-Keller's multiplication formula for acyclic cluster algebras of arbitrary type. The talk is based on a joint work with F. Xu. The Unique Embedding and Tietze Transformation YU Jie-Tai, *The University of Hong Kong*

A polynomial p in a polynomial or free associative algebra A over a field K (of characteristic zero) admits the unique embedding in A, if for any polynomial q in A, A/ is K-isomorphic to A/ < q > implies that there exists a K-automorphism of A taking p to q. The general Embedding Problem asks for a given polynomial p, whether p admits the unique embedding. In general the Embedding Problem has a negative solution. When p is a coordinate (free generatorgenerator) of A, the problem becomes the Embedding Conjecture of Abhyankar-Sathaye in case A is a polynomial algebra. For a free associative algebra A (i.e. noncommutative polynomial algebra), the corresponding Conjecture is well-known as a Problem of George Bergman.

When A is the polynomial algebra of rank 2, the Conjecture was solved by Abhyankar-Moh-Suzuki, but for rank more than 2, the Conjecture is still open. When A is the free associative algebra of any rank, the Conjecture (Bergman's problem) was completely solved by Vladimir Shpilrain and the speaker. In this talk, Tietze transformation, an approach to the Embedding Conjecture introduced by the speaker and his collaborator, will be explored. Some related topics, such as the Lifting Problem and the Tame Generator Conjecture, will be discussed. Among other things, the solution of Begman's Problem will be explained.

This talk is motivated by a recent question in affine Hecke algebra raised by Xi Nanhua.

On Classification of Quantum Groups Efim ZELMANOV, University of California at San Diego and The University of Hong Kong

I will talk about (i) a complete classification of formal solutions of the classical Yang-Baxter equation and (ii) classification of quantum groups of the polynomial algebra.

This is a joint work with F. Montaner and A. Stolin.

Block Coverings in Finite Groups ZHANG Jiping, *Beijing University*

We say that a finite group G is principally covered if any irreducible complex character of G lies in the principal p-block of G for some prime p. It has been conjectured that if G is principally covered then either G has only one p-block for some prime p or the Fitting subgroup of G is trivial. In this talk we confirm the conjecture, we also almost determine the generalized Fitting subgroup of G. This is a joint work with C. Bessenrodt.