Seattle Noncommutative Algebra Day

Oct. 21, 2023

ABSTRACT

On the Existence of N-Koszul Artin schelter Regular Algebras

Abdourrahmane Kabbaj

University of California, Irvine

An important subclass of Artin-Schelter regular algebras that has gained lots of attention in recent years is the class of N-Koszul Artin-Schelter regular algebras. While structurally rich with many results in the literature applicable to the entire subclass, the only known examples of such algebras are either when N = 2, i.e. the algebra is Koszul, or when N = 3. Under a mild Hilbert series assumption, we rule out the existence of N-Koszul Artin-Schelter regular algebras for N even. Furthermore, we set restrictions on the possible global dimension for such algebras.

Geometry in quantum affine spaces

Ken Goodearl

University of California, Santa Barbara

We will describe how the prime and primitive spectra of arbitrary quantum affine spaces $\mathcal{O}_q(K^n)$ can be described in purely classical terms, involving collections of affine schemes or varieties over K and morphisms among them.

Hopf algebras, monoidal categories, and cohomology

Sarah Witherspoon

Texas A&M University

Categories of modules for some types of rings have monoidal structure. Standard noncommutative examples are modules for Hopf algebras (tensor product over the underlying field) and bimodules for any ring (tensor product over the ring itself). This monoidal structure impacts cohomology (that is, Ext of the unit object): Cohomology is a graded commutative ring in light of two equivalent definitions of product, one by Yoneda splice, and one by tensor product. Cohomology is a graded Lie algebra with bracket given by loops in an extension category that connect four products (two by Yoneda splice in either order, and two by tensor product in either order). In this talk, we will introduce and explain all these ideas. Then we will focus on categories of modules for Hopf algebras. It has been known for some time that for quasitriangular Hopf algebras, this Lie structure is abelian. We will explain some newer techniques developed in joint work with Karadag, Negron, and Volkov that allow us to determine this Lie structure for some nonquasitriangular Hopf algebras. For example, the Lie structure is seen to be abelian as well for quantum elementary abelian groups.

Properties of locally gentle algebras

Sarafina Ford

University of Washington

Gentle algebras are a well-behaved and well-studied class of string algebras. If we relax the condition requiring them to be finite-dimensional, we obtain locally gentle algebras, which keep some of the nice properties of gentle algebras, but are much less understood. In this talk, we will discuss some of the properties of locally gentle algebras and their context in the larger picture of non-commutative Cohen-Macauley and Gorenstein algebras.

New developments in cohomology of finite group schemes (after W. van der Kallen)

Julia Pevtsova

University of Washington

In December of last year van der Kallen posted a 3 page paper on the arxiv called "A Friedlander-Suslin theorem of a Noetherian base ring". The title referred to a celebrated result of Friedlander and Suslin from 1995 who showed that cohomology of a finite group scheme (equivalently, any finite dimensional cocommutative Hopf algebra) over a field was finitely generated. Hence, van der Kallen offered a vast generalization of the result, taking only 3 pages to prove it! Since then, the paper has appeared, having grown to 5 pages, and I learnt a bit more about the parts of the proof which did not make it into the final 5 pages.

I'll talk about the history of the problem, open questions, motivation, and some things I have learnt about the proof though I cannot claim to have completely understood by now.

Bimodules in pointed fusion categories and quantum symmetries

Amrei Oswald

University of Washington

Quantum symmetries of path algebras can be understood as instances of tensor algebras in the category of representations of the appropriate quantum group, as in the framework developed by Etingof, Kinser, and Walton. Motivated by this, we investigate bimodules in pointed fusion categories.