Conference celebrating Clas Löfwall's and Ralf Fröberg's 80th birthdays

Stockholms universitet, Wednesday January 24, 2024

STOCKHOLMS UNIVERSITET

STOCKHOLMS MATEMATIKCENTRUM

Programme

Wednesday, 24 of January

Stockholm University, Albano, Lärosal 5*

9:00–9:10	**Welcoming by Joanna Tyrcha**	
9:10–9:50	**Rikard Bögvad** SU	Mathematics at the department in the eighties, seen from the (frog) perspective of a doctoral student
9:50–10:30	**Veronica Crispin Quinonez** Uppsala	Normal torsionfreeness of monomial ideals
10:30–10:45	**Fika**	
10:45–11:25	**Ralf Fröberg**	Betti numbers of truncations
11:25–12:05	**Clas Löfwall**	On the ring of differential operators on finite dimensional graded algebras
12:05–13:25	**Lunch at restaurant Proviant Albano**	
13:25–14:05	**Alexander Berglund** SU	Poincaré duality homomorphisms and graph complexes
14:05–14:45	**Ville Nordström** Oregon	Hochschild homology of DG categories
14:45–15:25	**Nirmal Kotal** Chennai	On the v-number of Gorenstein ideals and Frobenius powers
15:25–15:40	**Fika**	
15:40-16:20	**Boris Shapiro** SU	Non-unitary analogs of zonotopal algebras for (undirected) graphs
16:20-17:00	**Lisa Nicklasson** MDU	Binomial complete intersections
17:30–	**Dinner at restaurant Proviant Albano**	

*Lärosal 5 can be found at Albano, house 1, first floor.

List of Abstracts

Mathematics at the department in the eighties, seen from the (frog) perspective of a doctoral student

Rikard Bögvad

Stockholms Universitet

Normal torsionfreeness of monomial ideals

Veronica Crispin Quinonez

Uppsala Universitet

In this talk we discuss the associated primes of powers of certain classes of monomial ideals, in particular, some asymptotic behavours such as normality and when an ideal is normally torsion-free or possesses other connected properties. The ideals in question are squarefree and the results will be applied on edge and cover ideals. Moreover, some counterexamples to previously stated questions are provided. This is a joint work with Mehrdad Nasernejad.

Betti numbers of truncations

Ralf Fröberg

Let S be a polynomial ring and $R = S/I$ standard graded. Let $R_{\geq k} = S/I \cap M^k$, where M is the graded maximal ideal. We will show how to determine the Betti numbers of $R_{\geq k}$ if we know the Betti numbers of R and the Hilbert series of $R_{\geq k}$.

On the ring of differential operators on finite dimensional graded algebras

Clas Löfwall

We will define the ring of differential operators on a non-commutative ring R following Lunts and Rosenberg and prove that it is the full endomorphism ring in case R is a non-negatively graded connected finite dimensional algebra. If R in addition is 1-generated then the graded associated of the ring of differential operators, graded by the total degree, is also a non-negatively graded connected finite dimensional algebra. A program has been constructed, originally for the case of the exterior algebra, for computing the graded pieces of the graded associative of the ring of differential operators on any 1-generated non-negatively graded connected algebra of moderate total dimension (the program can handle the exterior algebra in 6 variables).

Poincaré duality homomorphisms and graph complexes

Alexander Berglund

Stockholms Universitet

A Poincaré duality homomorphism of dg commutative algebras is a homomorphism whose homotopy fiber satisfies Poincaré duality. Examples include homomorphisms of the form R -> R/I, where I is a Gorenstein ideal in a graded commutative algebra R. I will talk about certain remarkable higher structure, governed by Kontsevich's Lie graph complex, that can be associated to a Poincaré duality homomorphism.

Hochschild homology of DG categories

Ville Nordström

University of Oregon

In this talk I will give the definitions of DG categories and their Hochschild homology. We will see some examples of DG categories whose Hochschild homology groups are known and have simple descriptions. We will also see how the DG category point of view can help us understand the functorial properties of Hochschild homology as an invariant of rings.

On the v-number of Gorenstein ideals and Frobenius powers

Nirmal Kotal

Chennai Mathematical Institute

Let I be a proper graded ideal of a polynomial ring. The least integer d for which I:f is an associate prime of I for some homogeneous polynomial of degree d is the v-number of I, represented as v(I). The motivation behind studying the v-number has its foundation in algebraic coding theory, mainly to investigate the asymptotic behavior of the minimum distance function of Reed-Muller-type codes.

In this talk, we will see the equality of the v-number and Castelnuovo-Mumford regularity of Gorenstein monomial algebras and Stanley-Reisner rings of matroid complexes. Furthermore, we will see that the v-numbers of Frobenius powers of graded ideals have an asymptotically linear behavior. In the case of unmixed monomial ideals, we will discuss a method for computing the v-number without prior knowledge of the associated primes.

This is a joint project with Kamalesh Saha.

Non-unitary analogs of zonotopal algebras for (undirected) graphs

Boris Shapiro

Stockholms Universitet

About two decades ago three types of zonotopal algebras (external, central, and internal) have been associated to an arbitrary undirected graph G. They contain an abundance of information about G encoded in its Tutte polynomial. In particular, external algebras distinguish graphical matroids of graphs. Below we introduce their analogs in which we double each edge of G. The resulting algebras have nice combinatorial properties and, in particular, are monomial.

Binomial complete intersections

Lisa Nicklasson

Mälardalens Universitet

Consider a collection B of n homogeneous binomials $x_i^d - c_i m_i$ on n variables. Fixing the monomials $m_1, \ldots, m_n$, which choices of coefficients makes B a complete intersection? In other words, what is the resultant res(B)? In the case B is a complete intersection, what is a vector space basis for the quotient ring? The monomials not divisible by any x_i^d is a natural candidate, but how do we prove that this is indeed a basis? Constructing a directed graph from the binomials B will help us answer these questions!

The talk is based on a joint work with Filip Jonsson Kling and Samuel Lundqvist.