

Algebraic Geometry and Commutative Algebra  
Abstracts

**Saturday 10:15 – 12:15**

Irena Peeva, Cornell University  
Christine Berkesch, Duke University  
Ines Henriques, University of California at Riverside  
Adela Vraciu, University of South Carolina

**Saturday 3:15 – 5:15**

Laura Matusevich, Texas A&M University  
Roya Beheshti Zavareh, Washington University in St. Louis  
Angela Gibney, University of Georgia at Athens  
Jessica Sidman, Mount Holyoke College

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**Saturday 10:15 – 12:15**

**Resolutions over quadratic complete intersections**

Irena Peeva, Cornell University

This talk is on the structure of the linear part of a minimal free resolution over a quadratic complete intersection.

**Tensor complexes**

Christine Berkesch, Duke University

I will discuss two examples where free resolutions appear in algebraic geometry, in the study of determinantal varieties and the construction of resultants for multilinear systems of equations. I will then present a new construction for building multilinear free resolutions from tensors that simultaneously generalizes these examples. This is joint work with Daniel Erman, Manoj Kummini, and Steven Sam.

**Cohomology over quasi-complete intersections**

Ines Henriques, University of California at Riverside

We introduce and study a class of homomorphisms of commutative noetherian rings, which strictly contains the class of locally complete intersection homomorphisms, while sharing many of its remarkable properties. This is joint work with L. Avramov and L. Sega.

**The weak Lefschetz property for monomial complete intersection ideals in positive characteristic**

Adela Vraciu, University of South Carolina

We find explicit necessary and sufficient conditions for the ring  $k[x,y,z,w]/(x^d, y^d, z^d, w^d)$  to have the weak Lefschetz property when  $k$  is a field of positive characteristic. This is joint work with Andy Kustin.

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**Saturday 3:15 – 5:15**

**Hypergeometric functions and toric varieties**

Laura Matusevich, Texas A&M University

I will discuss structural issues relating to the classical hypergeometric equations of Horn type. The key idea (due to Gelfand, Graev, Kapranov and Zelevinsky) is to construct torus equivariant versions of these differential equations and study them using D-module theoretic techniques. Transferring results back to the original setting has proved challenging. I will report on recent progress in this direction, joint with Christine Berkesch.

**Spaces of rational curves on hypersurfaces**

Roya Beheshti Zavareh, Washington University in St. Louis

I will discuss some aspects of the geometry of spaces of rational curves on general Fano hypersurfaces including dimension, irreducibility, and birational geometry. A part of this talk is based on joint work with Mohan Kumar.

**Conformal blocks and the Mori dream space conjecture**

Angela Gibney, University of Georgia at Athens

Given a simple Lie algebra, a positive integer, and an appropriately chosen  $n$ -tuple of dominant integral weights, one can define a vector bundle on the moduli space of curves whose fibers are the so-called vector spaces of conformal blocks. On moduli spaces of pointed rational curves, first Chern classes of these vector bundles turn out to be semi-ample divisors, and so define morphisms. In this talk I will discuss the simplest examples of these divisors, and discuss how they relate to a big-picture conjecture of Hu and Keel about the birational geometry of the moduli space.

**Arrangements of Lines: Syzygies and secants**

Jessica Sidman, Mount Holyoke College

We discuss arrangements of lines that are curves of genus  $g$  embedded in projective space. We produce embeddings whose ideals are generated by products of linear forms. We also discuss the syzygies of these

line arrangements as well as the syzygies of their secant varieties.