BrianFest
at the
University of Nebraska-Lincoln
Friday-Saturday, August 11-12, 2023
115 Avery Hall

Program
Friday, August 11

9:00-9:15 a.m.	Registration	
9:15-9:30 a.m.	Opening Remarks	
9:30-10:20 a.m.	**Tomasz Szemberg**	Through base loci towards positivity
10:30-11:00 a.m.	Coffee Break	
11:00-11:30 a.m.	**Joaquim Roé** (virtual)	On the boundary of the Mori cone of general blowups of the plane
11:40-12:30 p.m.	**Juan Migliore**	Star configurations, and their progenitors and descendants
12:40-2:00 p.m.	Lunch Break	
2:00-2:50 p.m.	**Elena Guardo**	Steiner systems and configurations of points
3:00-3:10 p.m.	**Mystery Speaker**	
3:10-3:40 p.m.	Coffee Break	
3:40-4:30 p.m.	**Mike Janssen**	On symbolic powers of ideals
6:00 p.m.	Reception	

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Program
Saturday, August 12

9:00-9:30 a.m.	**Sandra Di Rocco** (virtual)	Relative Polar Geometry of Algebraic Data
9:40-10:10 a.m.	**Halszka Tutaj-Gasińska** (virtual)	Some constructions of unexpected hypersurfaces
10:20-11:00 a.m.	Coffee Break	
11:00-11:50 a.m.	**Uwe Nagel**	Expect to be Surprised: Brian Harbourne's Contributions on Unexpected Properties
12:00-1:00 p.m.	Poster Session	
1:00-2:30 p.m.	Lunch Break	
2:30-3:20 p.m.	**Eloísa Grifo**	A survey of Harbourne's Conjecture
3:30-4:00 p.m.	Coffee Break	
4:00-4:10 p.m.	**Mystery Speaker**	
4:10-5:00 p.m.	**Cristiano Bocci**	Fantastic points and where to find them
5:10-5:20 p.m.	Closing Remarks	

BrianFest
Speaker Abstracts
Friday, August 11

Tomasz Szemberg
Title: Through base loci towards positivity
Abstract:
I will recall the Nagata Conjecture and discuss various formulations of the problem and related problems concerning linear systems with imposed base points. Then I will pass to linear systems with higher dimensional base loci and discuss a couple of our joint results aiming to shed light on unexplored structures expected behind them.

Joaquim Roé
Title: On the boundary of the Mori cone of general blowups of the plane
Abstract:
Let $X_n \to P^2$ be the blowup of the plane at n points in very general position. If n>9, the shape of the Mori cone of X_n is expected to have a simple description as a consequence of the Segre-Harbourne-Gimigliano-Hirschowitz conjecture, but relatively little has actually been proven. We will report on recent progress in this direction.

This is joint work with C. Ciliberto and R. Miranda

Juan Migliore
Title: Star configurations, and their progenitors and descendants
Abstract:
Star configurations have featured in the work of many authors, in different contexts. One of the first papers to focus directly on these objects themselves was a 2013 joint paper of mine with Brian and Tony Geramita. However, like all interesting objects in mathematics, there is work that led in a natural way to star configurations, and they led to natural generalizations and applications. In this talk, I will try to describe some of the history and machinery, and some of the consequences. Work with Brian and Tony will play a central role in my talk. In particular, I'll talk about how this machinery led to results about fat points. In addition to Brian and Tony, Uwe Nagel also played a major role in the work I'll describe.

Elena Guardo

Title: Steiner systems and configurations of points

Abstract:

In this talk we introduce special configurations of reduced points in P^n constructed from a Steiner System, combining Combinatorial Algebraic Geometry and Commutative Algebra. In particular, we associate two ideals, in a suitable polynomial ring, defining a Steiner configuration of points and its Complement. We focus on the Complement of a Steiner configuration of points since it is a proper hyperplanes section of a monomial ideal that is the Stanley-Reisner ideal of a matroid. This connection allows us to study the homological invariants of the ideal I_{X_C} of the Complement of a Steiner configuration, such as Hilbert Function, Betti numbers, Waldschmidt constant, resurgence. We also compute the parameters of linear codes associated to any Steiner configuration of points and its Complement.

This is joint work with E. Ballico, G. Favacchio and L. Milazzo

Mike Janssen

Title: On Symbolic Powers of Ideals

Abstract:

We'll survey recent and historical results regarding symbolic powers of ideals. We begin with their roots in geometry and commutative algebra before highlighting work on fat point subschemes, the containment problem, and related questions.

Sandra DiRocco
Title: Relative Polar Geomerty of Algebraic Data
Abstract:
Tangential properties of embedded varieties have proven to be effective measures of their shape and topology in projective geometry. These properties are captured by the so-called polar classes. In this context, degrees and intersections of polar classes provide valuable numerical bounds, offering insights into critical points of rational functions and estimating the appropriate density of a point-sample of the variety.

During our discussion, we will revisit these results and introduce similar bounds specifically for the case when the locus of interest is a sub-variety rather than the entire variety. This extension allows us to examine the shape and topology of specific regions within the variety. The presentation is based on (on going) joint work with L. Gustafsson and L. Sodomaco and previous work with D. Eklund and M. Weinstein.

Halszka Tutaj Gasinska
Title: Some constructions of unexpected hypersurfaces.
Abstract:
In 2016 the groundbreaking paper of Brian Harbourne and Robert Cook II, Juan Migliore and Uwe Nagel appeared, introducing the notion of unexpected curves and presenting the famous example of unexpected quartic. Since then, the topic of unexpected curves and, more generally, unexpected hypersurfaces, was widely investigated.

In my talk I present some ways of constructions of unexpected hypersurfaces. For these constructions Brian Harbourne was an author, co-author or an inspiration.

Uwe Nagel
Title: Expect to be Surprised: Brian Harbourne's Contributions on Unexpected Properties
Abstract:
It is surprisingly often the case that a naive dimension count correctly predicts the actually dimension of a vector space. Attempting to understand when the naive count and the actual dimension differ has been a theme throughout Brian Harbourne's mathematical career. We will survey some of his contributions to detecting and explaining unexpected properties, beginning with the SHGH Conjecture on fat points in the plane and then moving to recent developments on the existence of unexpected curves and hypersurfaces.

Eloísa Grifo

Title: A survey of Harbourne's Conjecture

Abstract:

Harbourne's conjecture on the containment problem for symbolic and ordinary powers of ideals does not hold in its original form, but it has sparked a lot of different research avenues. In this talk, we will discuss the history of Harbourne's Conjecture and some of the known counterexamples, but mostly focus on the different variations of the conjecture that are true or still open.

Cristiano Bocci

Title: Fantastic points and where to find them

Abstract:

In this talk I will show how to use Hadamard products to construct two nice configurations of points: Gorenstein sets of points in P3 and points in a grid in P2 with given multiplicities (Hadamard fat grid, HFG). For the case of Gorenstein points I will show how, given ad admissible h-vector h, we can use Hadamard product to determine a set of points with h-vector h. For the HFG, I will show how to construct them and some result about waldschmidt constant and resurgence on HFG.

Poster Presenters

- Reid Buchanan, Oklahoma State University, **Macaulay Coefficients and Decomposing Lex Segments**

- Sebastian Calvo, Pennsylvania State University, **The Icosahedral Line Configuration and Waldschmidt Constants**

- Lucja Farnik, Pedagogical University of Cracow, **Unexpected cones and geproci sets**

- Karthik Ganapathy, University of Michigan, **The infinite variable polynomial ring in positive characteristic**

- Allison Ganger and Levi Heath, University of Nebraska, **Infinitesimally geproci sets**

- Sean Grate, Auburn University, **Betti tables forcing failure of the Weak Lefschetz Property**

- Thiago Holleben, Dalhousie University, **Lefschetz properties of squarefree monomial ideals**

- Arvind Kumar, New Mexico State University, **On resurgence numbers of cover ideal of graphs**

- Nikola Kuzmanovski, University of Nebraska, **Generalizations of Macaulay's lex ideal theorem**

- Adam LaClair, Purdue University, **Castelnuovo-Mumford regularity of binomial edge ideals**

- Cheng Meng, Purdue University, **Multiplicities in flat local extensions**

- Michael Morrow, University of Kentucky, **Computing Groebner Bases and Free Resolutions of OI-Modules**

- Ritvik Ramkumar, Cornell University, **Cartwright-Sturmfels ideals and their moduli**

- Shahriyar Roshan-Zamir, University of Nebraska, **Interpolation in the Weighted Projective Space**

- Naufil Sakran, Tulane University, **Unipotent Numerical Semigroups**

- Andrew Soto Levins, University of Nebraska, **A Rigidity Theorem for Ext**

- Stephen Stern, University of Nebraska, **On Alexander Self-duality**

- Likun Xie, University of Illinois at Urbana-Champaign, **On an Instance of the Small Cohen-Macaulay Conjecture**

- Frank Zimmitti, University of Nebraska, **Unexpectedness stratified by codimension**