Commutative Algebra
Algèbre commutative
(Org: **Susan Cooper** (Manitoba) and/et **Sarah Mayes-Tang** (Toronto))

ASHWINI BHAT, Kennesaw State University
Invariants of Q-Borel Ideals

Q-Borel ideals are monomial ideals satisfying the generalized Borel property first introduced by Francisco, Mermin, and Schweig in 2013. We will look at homological invariants of special collections of Q-Borel ideals.

SANKHANEEL BISUI, University of Manitoba
Containment and Lower Bounds on Waldschmidt Constant

Nagata raised the following fundamental question:

"Given a finite set of points $X = \{P_1, \dots P_s\} \subset \mathbf{P}^2_{\mathbb{C}}$ what is the minimal degree, $\alpha_x(t)$ of a hyper-surface that passes through the points with multiplicity at least t?"

Chudnovsky provided a conjectural answer to the above question. Chudnovsky's conjecture has an equivalent statement involving a lower bound of the Waldschmidt constant of the ideal defining points. Demailly later on generalized Chudnovsky's conjecture. Harbourne and Huneke gave a containment conjecture involving the symbolic and the ordinary powers of the ideals, which implies gives the bounds on Waldschmidt constant of the ideals. We studied the stable-version of the containment conjecture and consequently, we proved Chudnovsky conjecture for a large number of general points. In this talk, I will introduce Chudnovsky's conjecture (similar bounds), the containment conjectures, and the tools that we used. I will be presenting the results from our joint work with Eloísa Grifo, Huy Tài Hà, and Thái Thành Nguyên.

CHRIS FRANCISCO, Oklahoma State University
Unique sets of graded Betti numbers and forbidden cancellations

If one knows the graded Betti numbers of a module, one can compute the Hilbert function. However, given a Hilbert function, there may be many possible sets of graded Betti numbers that occur for modules with that Hilbert function. In certain cases, the Hilbert function uniquely determines the set of graded Betti numbers, but characterizing when that happens is difficult. We will survey some work in this area, including some useful tools introduced to identify when potential resolutions cannot occur, and we will pose some open questions.

BRIAN HARBOURNE, University of Nebraska-Lincoln
The concept of geproci subsets of P3

The occurrence of finite subsets Z of P3 whose general projection to P2 is a complete intersection was raised in 2011 by F. Polizzi. Such sets are now called geproci sets. One example: a complete intersection in a plane. Another example: grids of lines. Other examples became known only in 2018 as a by-product of work on unexpected surfaces, in turn motivated by work on hyperplane arrangements. I will survey how geproci developed, how it relates to unexpectedness and discuss some recent results.

CRAIG KOHNE, McMaster University
The Waldschmidt constant for some monomial ideals

The Waldschmidt constant is an invariant of an ideal I which measures the growth of the symbolic power (denoted $I^{(n)}$) relative to the regular power (denoted I^n) as n increases. When I is a monomial ideal the Waldschmidt constant can be computed as the value of a linear program. We will discuss how studying the underlying polytope of the linear program gives insight into the behaviour of the Waldschmidt constant for some classes of monomial ideals (including low dimensional ideals and squarefree Borel ideals).

BENJAMIN NOTEBOOM, North Dakota State University

Decompositions of Symbolic Powers

Symbolic powers of ideals have been a recent topic of study for commutative algebraists, particularly how they compare to regular powers. In this talk, we'll use tools from graph theory to find a decomposition of a certain class of symbolic powers, then discuss how that decomposition can be used to calculate invariants of symbolic powers, such as the Waldschmidt constant.

QUESTION AND ANSWER PERIOD,