Algebraic Combinatorics

(Org: **Mike Zabrocki** (York University))

NANTEL BERGERON, York University
An Hopf Monoid of supercharacter

Recently, we (27 of us) have shown an isomorphism between the supercharacter theory of the upper unitriangular matrices over a finite field and the combinatorial Hopf algebra of symmetric functions. With M.Aguiar and N.Thiem, we have recently "lifted" the Hopf algebra structure on supercharacter to an Hopf monoid on species. One advantage to this approach is that one can then obtain multiplicity free formulas for the antipode in different basis. I will discuss this.

SARA FARIDI, Dalhousie University
Resolutions of monomial ideals

This talk will focus on some recent developments in resolutions of monomial ideals, and on Cohen-Macaulay properties of monomial ideals. The techniques used are from graph theory and from hypergraph theory. In particular, some special cases where betti numbers can be completely described via a direct or recursive formula will be discussed.

ADRIANO GARSIA, University of California San Diego
Combinatorial properties of Parking Functions and Diagonal Harmonics

Recent work of Haglund-Morse-Zabrocki has opened up a variety of problems and Conjectures in the combinatorics of Parking functions and Diagonal Harmonics. In this talk we will present the latest progress.

ANGELA HICKS, University of California-San Diego
Parking Function Properties Suggested by the Haglund-Morse-Zabrocki Conjecture

The "diagonal composition" of a parking function gives the distance in its main diagonal between successive hits of its Dyck path. Recently Jim Haglund, Jennifer Morse, and Mike Zabrocki gave a sharpening of the "shuffle conjecture" namely that for any composition c, applying ∇ to a certain Hall-Littlewood polynomial indexed by c gives a weighted sum of the parking functions of diagonal composition c. We examine parking function properties implied by their conjecture.

KURT LUOTO, University of British Columbia
Quasisymmetric and noncommutative Schur functions

Haglund, Mason, van Willigenburg, and this author introduced a family of quasisymmetric functions which we call quasisymmetric Schur (QS) functions. We extend these to skew QS functions, which are counterparts to the classical skew Schur functions. Intimately related to these are the duals of the QS functions, which are noncommutative analogs of the classical Schur functions, having analogous properties such as a Littlewood-Richardson rule.

Joint work with Christine Bessenrodt and Stephanie van Willigenburg.