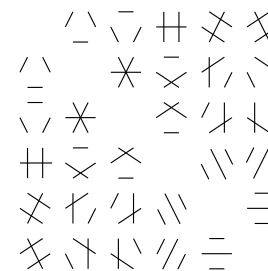# Mathematics Seminar

Rocky Mountain Algebraic Combinatorics Seminar

Character conditions and normal subgroups

Shawn Burkett

Kent State University

There are many results in character theory that determine some restrictions on the structure of a (finite) group whose nonlinear irreducible characters have some special property. A famous example of this is Thompson's Theorem, which states that a group G is p-nilpotent if the prime p divides the degree of each nonlinear irreducible character of G. A quarter of a century later, this result was extended by Isaacs and Knutson to the following result about normal subgroups: If p divides the degree of every irreducible character of G lying over some nonlinear irreducible character of the normal subgroup N, then N is solvable and p-nilpotent. Motivated by this result, we show that a number of other theorems can also be extended in this way. Then we restrict our attention to p and p' characters and generalize these results even more, ultimately obtaining sufficient character-theoretic conditions for the p-closedness or p-nilpotence of a normal subgroup.

A crystal for stable Grothendieck polynomials

Wencin Poh

UC Davis

We construct a type A crystal, which we call the $*$-crystal, whose character is the stable Grothendieck polynomials for fully-commutative permutations. This crystal is a K-theoretic generalization of Morse-Schilling crystal on decreasing factorizations. Using the residue map, we showed that this crystal intertwines with the crystal on set-valued tableaux given by Monical, Pechenik and Scrimshaw. We also proved that this crystal is isomorphic to that of pairs of semistandard Young tableaux using a newly defined insertion called the $*$-insertion. The insertion offers a combinatorial interpretation to the Schur positivity of the stable Grothendieck polynomials for fully-commutative permutations. Furthermore, the $*$-insertion has interesting properties in relation to row Hecke insertion and the uncrowding algorithm. This is joint work with Jennifer Morse, Jianping Pan and Anne Schilling.

Online via Zoom

`https://zoom.us/j/95321487441?pwd=Tlp4VG9pejZCekJmeDFFb1BzeWpsdz09`, Meeting ID: 953 2148 7441, Passcode: 722523

4 pm, Friday, October 30, 2020

Talk part 1, 4.10-4.40,

Break 4.40-5.10 at `https://gather.town/HQmdvgyabpEL4qpB/RMAC`,

Talk part 2 5:10-5:40

This is a joint Denver U / UC Boulder / UC Denver / U of Wyoming / CSU seminar that meets biweekly.

Anyone interested is welcome to join us at a local restaurant for dinner after the talks.

Colorado State University

Department of Mathematics
Fort Collins, Colorado 80523