Mathematics Seminar

Rocky Mountain Algebraic Combinatorics Seminar

Topological generation of algebraic groups (and applications)

Spencer Gerhardt
Colorado State University

Class generation problems arise in a number of different contexts, often as a tool for solving a seemingly unrelated problem. In this talk we consider a particular generation problem for algebraic groups which has applications to random generation of finite simple groups and linear representations of algebraic groups.

Let G be a simple algebraic group defined over a sufficiently large field. Let $C_1, \ldots, C_e$ be some conjugacy classes of G. We consider the following question: what are necessary and sufficient conditions for the existence of a tuple $(x_1, \ldots, x_e) \in C_1 \times \ldots \times C_e$ such that $\langle x_1, \ldots, x_e \rangle$ is Zariski dense in G? The solution yields new results on generic stabilizers in linear representations of algebraic groups, and can be used to strengthen existing results on random (r, s)-generation of finite groups of Lie type. Some work in this talk is joint with Tim Burness and Robert Guralnick.

Representation theory and additive combinatorics in algorithms for matrix multiplication

Joshua Grochow
University of Colorado, Boulder

How hard it is to multiply matrices is a central open question in computational complexity, with ties to algebraic geometry and representation theory. In this talk I'll survey some recent work on matrix multiplication which brings together algorithms, representation theory, and additive combinatorics. Highlights include a transparent proof (joint with C. Moore) of Strassen's original 1969 algorithm for matrix multiplication - which was the first to beat $\mathcal{O}(n^3)$ steps - and using ideas from the resolution of the Cap Set Conjecture to deepen our understanding of the Cohn-Umans group-theoretic approach to matrix multiplication (joint with J. Blasiak, T. Church, H. Cohn, E. Naslund, W. F. Sawin, and C. Umans).

Weber 223
4–6 pm
Friday, October 6, 2017
(Refreshments in Weber 117, 3:30–4 pm)
Colorado State University

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.

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