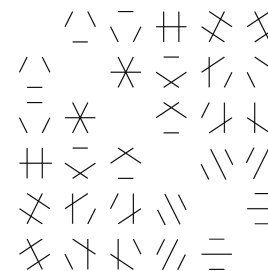


# Mathematics Seminar



## Rocky Mountain Algebraic Combinatorics Seminar

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### Automorphisms of small $p$ -groups

Josh Maglione  
Colorado State University

One of the basic, and still unanswered, questions concerning  $p$ -groups is whether or not the automorphism group of a  $p$ -group is also a  $p$ -group. Within the last few years, we have developed algorithms to improve the task of computing automorphisms of  $p$ -groups. We were asked to use these algorithms to expand the known data concerning this question about automorphism groups, but along the way, we encountered an uncompromising class of groups. We constructed an algorithm to efficiently compute automorphisms for these groups, which naturally fits into work with P.A. Brooksbank and J.B. Wilson on groups of genus 2. In addition, we also find that many small  $p$ -groups have an automorphism whose order is not a power of  $p$ .

### A weighted version of matrix-tree theorem and its application to simplicial complexes.

Ghodratollah Aalipour  
University of Colorado, Denver

The well-known Kirchhoff matrix-tree theorem counts the number of spanning trees of a graph in terms of its non-zero Laplacian eigenvalues. By assigning a weight to each edge of the graph, the new weighted Laplacian matrix contributes well to find the corresponding vertex-degree generating function for the number of spanning trees of the graph. This powerful technique has been extended to simplicial and cellular complexes by Duval, Klivans and Martin. In this talk, we present a slight improvement of their generalized matrix-tree theorem. As an application, we obtain the weighted count for spanning trees in several families of simplicial and cellular complexes. This is joint work with Art Duval and Jeremy L. Martin.

Weber 223  
4–6 pm  
Friday, October 9, 2015  
(Refreshments in Weber 117, 3:30–4 pm)  
Colorado State University

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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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