

# Topology, Arithmetic, & Dynamics Seminar

Counting matrices with forced zero entries

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Let  $m_r(B; q)$  be the number of matrices of rank  $r$  over the finite field  $F_q$  having support on a subset  $B$  of the  $n$  by  $n$  square grid. This function arises in enumerative combinatorics as a " $q$ -analogue" of the counting function for nonattacking rook placements (i.e., partial permutations) on a board  $B$ . In the late 90s, Haglund showed that when  $B$  is a Ferrers board, the function  $m_r(B; q)$  is a polynomial in  $q$  whose coefficients have combinatorial meaning. Nearly simultaneously, Stembridge gave an example of a board  $B$ , related to the Fano plane, for which  $m_n(B; q)$  is not a polynomial function of  $q$ . In this talk we'll discuss this dichotomy and describe improvements on both ends: using tools from coding theory to extend the family of boards exhibiting nice behavior to inversion diagrams of permutations, and giving an analysis of the bad behavior of general boards.

**Date: Friday, October 6, 2017**

**Time: 2:30-3:20 pm**

**Place: 4106 Exploratory Hall**

For special accommodations, please contact Sean Lawton via email at [slawton3@gmu.edu](mailto:slawton3@gmu.edu).