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**ALEJANDRO MORALES**, LaCIM, Université du Québec à Montréal

*Counting matrices over finite fields with zeroes on Rothe diagrams*

A  $q$ -analogue of permutations with restricted positions is invertible matrices over a finite field of size  $q$  with support that avoids some entries. The number of such matrices may not be a polynomial in  $q$  (Stembridge) but for some nice cases the numbers are nice polynomials. We generalize a result of Haglund by showing that when the support lies in a skew shape, the number of such matrices is a polynomial with nonnegative coefficients. We also study the situation when the zeroes are the entries of the Rothe diagram of a permutation.

Joint work with Aaron Klein and Joel Lewis.