



## Poset topology and permutation statistics

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Various connections between permutation statistics and poset topology have been explored in the literature over the past three decades originating with the work of Stanley. In this talk I will present a connection, recently discovered with John Shareshian. I will discuss how a study of the topology of a certain interesting class of posets has led to results and conjectures on a new  $q$ -analog of the Eulerian polynomials. These new  $q$ -Eulerian polynomials are the enumerators for the joint distribution of the excedance number and the major index. One of our conjectures is a formula for their  $q$ -exponential generating function, which is a nice  $q$ -analog of a well-known formula for the exponential generating function of the Eulerian polynomials. A more general version of this conjecture involves an intriguing new class of quasisymmetric functions and a representation of the symmetric group on the cohomology of the toric variety associated with the Coxeter complex of the symmetric group, studied by Procesi, Stanley, and Stembridge.

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