The algebra and geometry of ordered set partitions

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Abstract

The combinatorics of permutations in the symmetric group $S_n$ has deep connections to algebraic properties of the coinvariant ring (through work of Artin, Chevalley, Lusztig-Stanley, and others) and geometric properties of the flag variety whose points are complete flags in $\mathbb{C}^n$ (through work of Ehresmann, Borel, and others). We will discuss new generalizations of the coinvariant ring and flag variety indexed by two positive integers $k \leq n$. The algebraic and geometric properties of these objects are controlled by ordered set partitions of $[n]$ with $k$ blocks. There are connections between these objects and the Delta Conjecture in the theory of Macdonald polynomials. Joint with Jim Haglund, Brendan Pawlowski, and Mark Shimozono.