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Eulerian Enumeration and Other Illustrations of the Peak Phenomenon

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The peak algebra, introduced by John Stembridge in connection with the combinatorial study of shifted tableaux and Schur Q-functions, has recently emerged as a natural algebraic setting to study flag enumeration in Eulerian posets, in particular face-lattices of convex polytopes.

I will discuss the peak algebra and Eulerian enumeration in the broader context of the following peak phenomenon:

Given a statement regarding the algebra of quasisymmetric functions (these include the symmetric functions), there is an analogous statement that holds for the peak subalgebra (these include Schur's Q-functions).

I will give some examples of this phenomenon, and explain what implications it might have for the study of flag f-vectors, the cd-index, and related invariants on posets.

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