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DESCENTS, PEAKS, AND CONFIGURATION SPACES

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Louis Solomon observed in the 1970s that, within the group algebra of the symmetric group, there is an interesting subalgebra spanned linearly by sums of permutations with the same sets of descents. Later work of several authors showed that this contains a further subalgebra spanned by sums of permutations with the same numbers of descents, and that this has a connection with the topology of configuration spaces of n labeled distinct points in odd dimensional Euclidean spaces. We review some of this story, as well as an analogous story that replaces descent sets with peak sets of permutations. We then report on the connection to topology, which is new.

Joint work with Marcelo Aguiar and Sarah Brauner.