

# Lyndon words and the loop Grassmannian

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In the representation theory of KLR algebras, the cuspidal modules are indexed by the good Lyndon word giving the maximal weight, and the simple modules are heads of the standard modules (shuffle products of cuspidal modules). This is a categorification of the relation between the PBW basis and the canonical basis of the quantum group. In this work we analyse how a similar phenomenon appears inside the loop Grassmannian. The key which makes it work is that the generators of the group are exponentials of the generators of the Lie algebra, and the combinatorics of the Lie algebra (which produces the Lyndon words) is reflected in the Steinberg—Tits relations for the Chevalley group. This enables one to use Lyndon words to control the combinatorics of expressions in the Chevalley group.

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