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Newton polytopes for flag varieties and spherical varieties

We generalize a result of A. Okounkov regarding the Gelfand-Cetlin polytopes for $Sp(2n, \mathbb{C})$ to any reductive algebraic group G over $\mathbb{C}$. The main result is a natural description of the string polytopes associated to the irreducible representations of G as the Newton polytopes for the flag variety. Moreover we generalize this to the string polytopes of spherical varieties. From the main result the existence of natural SAGBI bases, and hence toric degenerations, for the homogeneous coordinate ring of the flag varieties and spherical varieties will follow. Also generalizing the results of Khovanskii in toric case, we show how to compute the (arithmetic and geometric) genus of complete intersections in a spherical variety (in particular a flag variety) from the combinatorics of its string polytope.