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Diagrammatic Calculus for Singular Bott-Samelson Varieties

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Singular Bott-Samelson varieties provide resolutions of singularities for Schubert varieties in partial flag varieties. The cohomology of these varieties can be treated as a bimodule, an algebraic object, which contains crucial information about the representation theory of reductive algebraic groups. Using a diagrammatic language, we study these bimodules and describe a basis, called "singular light leaves", for their space of morphisms. The construction of this basis has concrete applications in computing character formulas for reductive groups, as well as theoretical implications, paving the way for a diagrammatic definition of the singular Hecke category in representation theory. This is a joint project with B. Elias, H. Ko, and N. Libedinsky.

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