DIAGRAMMATIC LUSZTIG–VOGAN CATEGORIES

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Abstract:
The Kazhdan–Lusztig conjecture (1979) relates the decomposition numbers of complex semisimple Lie algebra representations in terms of a special change of basis in the Hecke algebra. In a subsequent proof of the conjecture, a complete diagrammatic language was developed for the categorification of the Hecke algebra, the category of Soergel bimodules, following the effort of various people throughout the 2000s and 2010s. The theory of real reductive Lie groups carries a result analogous to the KL-conjecture by Lusztig and Vogan (1983), that the Lusztig–Vogan modules over the Hecke algebra capture composition multiplicities of $(\mathfrak{g}, K)$-modules. We will motivate diagrammatic tools in mathematics and present the beginnings of a diagrammatic theory for a categorification of these Lusztig–Vogan modules.