JOEL KAMNITZER, University of Toronto

Perfect bases in the representation theory of semisimple Lie algebras

A famous foundational problem concerns finding combinatorial expressions for tensor products of irreducible representations. A conceptually satisfying way to answer this question is to find bases for representations which restrict to bases of tensor product multiplicity spaces. These bases are called "good" or "perfect" and were first proposed 35 years ago by Gelfand and Zelevinsky. The construction of such bases is more difficult than one might expect and cannot be achieved by elementary means: they require geometric inputs such as the geometric Satake correspondence (Mirkovic-Vilonen), or the theory of perverse sheaves on quiver varieties (Lusztig). This left open the problem of comparing perfect bases obtained by geometric constructions. Recently, with Pierre Baumann and Allen Knutson, we developed some techniques for this comparison, and with Anne Dranowski and Calder Morton-Ferguson, we proved that the Mirkovic-Vilonen basis and the dual semicanonical basis are not the same.