

December 11, 2013: Ben Elias (MIT), *A q -deformation of geometric Satake in type A .*

Geometric Satake is an equivalence between two (symmetric) monoidal abelian categories (or 2-categories). The first is the 2-category of equivariant perverse sheaves on the affine Grassmannian, which we prefer to view, by results of Soergel and Harterich, as a certain sub-2-category of singular Soergel bimodules. Soergel bimodules are algebraically defined objects, constructed directly (in this case) from the reflection representation of the affine Weyl group. On the other side of the equivalence, we have the 2-category of representations of the Langlands dual Lie algebra.

In type A there are combinatorial replacements for both sides, i.e., additive monoidal subcategories whose idempotent closure is the original category, but possessing an algebraic description by generators and relations. Using this presentation, we demonstrate an isomorphism between these combinatorial replacements, giving a new proof of geometric Satake. Better still, both algebraic presentations admit q -deformations, compatible with this isomorphism. This yields an equivalence between representations of the (dual) quantum group, and singular Soergel bimodules attached to a q -deformation of the reflection representation.