

Geometry, Physics, and Representation Theory
Northeastern University

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Coherent sheaves on Coulomb branches.

Abstract

Work of Bezrukavnikov and Kaledin showed that the category of coherent sheaves on certain special conic symplectic resolutions (a special class of quasi-projective varieties) has a very special structure: it is derived equivalent to the representations of a noncommutative algebra arising from deformation quantization, and in fact, these derived equivalences stitch together into D-equivalences between the different crepant resolutions of a single singular affine variety. Together, these equivalences compose to give an action of a generalization of the braid group on this category.

While this picture is quite beautiful, the general implementation of it is hard to make explicit. I'll discuss a special case where this is more tractable: the Coulomb branches, recently defined mathematically by work of Braverman, Finkelberg and Nakajima, in particular for quiver gauge theories. In this case, the non-commutative algebras underlying this picture have a very concrete realization: they are versions of KLR algebras drawn on cylinders. Using this realization, one can, for example, prove the (recently proven) conjecture of Bezrukavnikov and Okounkov relating the group action above to the monodromy of the quantum connection for quiver varieties/Slodowy slices in type A.