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Geometric constructions in representation theory and symplectic duality

There are two geometric realizations of the representations of a semisimple Lie algebra. The first construction uses quiver varieties, while the second uses geometric Langlands duality. A long-standing open problem is to relate these two geometric constructions. We are now very close to answering this question using some input from theoretical physics, in particular through the moduli of vacua for 3d supersymmetric field theories.