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Quantized symplectic actions and W -algebras

With a nilpotent element in a semisimple Lie algebra \mathfrak{g} one associates a finitely generated associative algebra W called a W -algebra of finite type. This algebra is obtained from the universal enveloping algebra $U(\mathfrak{g})$ by a certain Hamiltonian reduction.

The study of W -algebras traces back to the celebrated Kostant paper “On Whittaker vectors and representation theory”, 1978. We observe that W is the invariant algebra for an action of a reductive group G with Lie algebra \mathfrak{g} on a quantized symplectic affine variety and use this observation to study W .

Our results include a relation between the sets of prime ideals of W and of the corresponding universal enveloping algebra and separation of elements of W by finite dimensional representations.