The Grosshans principle for Hopf algebras and the quantum Weitzenböck theorem

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Let k be an algebraically closed field. Given an affine variety W (over k), we denote by $k[W]$ the algebra of regular functions on W. Let G be an affine algebraic group (over k) and let H be a closed subgroup of G. The well known Grosshans principle says that if G acts rationally on an algebra A, then the algebra of invariants A^H is isomorphic to the algebra $(k[G]^H \otimes A)^G$, where the action of H on the algebra A is given by $(hf)(g) = f(gh)$ for $f \in k[G]$, $h \in H$ and $g \in G$. This principle implies that if G is reductive and the algebra $k[G]^H$ is finitely generated, then the algebra A^H is finitely generated, provided so is A. One of the consequences of this fact is the following classical result.

Theorem (Weitzenböck, 1932). Suppose that $char(k) = 0$ and the additive group $G_a = (k, +)$ acts rationally on a finite dimensional vector space W. Then the algebra of invariants $k[W]^{G_a}$ is finitely generated.

The main objective of my talk is to show that Grosshans's principle works naturally for Hopf algebras. As an application we present a quantum version of the Weitzenböck theorem.