

Generalized quantum doubles with projection

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Abstract: This is joint work with Daniel Bulacu, U. Bucharest. If U and V are bialgebras over a field k with an invertible skew pairing $\rho : U \otimes V \rightarrow k$, one can form the generalized quantum double $D(U, V)$. For example, if $H = V$ is a Hopf algebra and $U = (H^0)^{\text{cop}}$, then the evaluation map $ev : (H^0)^{\text{cop}} \otimes H \rightarrow k$ is a skew pairing and $D((H^0)^{\text{cop}}, H)$ is a Hopf algebra. If H is finite dimensional then $D(U, V)$ is the usual Drinfeld double $D(H)$. Following the approach of Doi and Takeuchi, we note necessary and sufficient conditions for the existence of a bialgebra projection π from $D(U, V)$ to U or to V that splits the inclusion map and explicitly describe the structure of the subalgebra of π -coinvariants as a bialgebra in ${}^W_W\mathcal{YD}$, the category of left-left Yetter Drinfeld modules over $W = \text{Im}\pi$. Applying our theory to a coquasitriangular Hopf algebra (H, σ) , we see that H has an associated structure of braided Hopf algebra in ${}^{H_\sigma^{\text{cop}}}_{H_\sigma}\mathcal{YD}$ where H_σ is a subHopf algebra of H^0 , the finite dual of H . For H finite dimensional, then H_σ is the minimal quasitriangular Hopf algebra in H^* .