

# A pair of Frobenius pairs for Hopf modules

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We report on the existence of two adjoint triples for Hopf (bi)modules over a bialgebra  $H$  and we investigate under which conditions these form a Frobenius pair.

Namely, on the one hand the functor  $- \otimes H$  from vector spaces to right Hopf modules over  $H$  admits both a left and a right adjoint. While studying when these form a Frobenius pair, we run into an equivalent characterization of (some) one-sided Hopf algebras in the sense of Green, Nichols and Taft, *Left Hopf Algebras*, J. Algebra (1980). On the other hand, also the functor  $- \otimes H$  from left  $H$ -modules to right Hopf bimodules admits both a left and a right adjoint. The analysis of this case is still under consideration, but it is already evident that being Frobenius for the latter is strictly connected to the category of left  $H$ -modules being rigid.