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Actions of pointed Hopf algebras on matrix rings

Let H be a finite dimensional pointed Hopf algebra with an abelian group G of group-like elements, over a field k which contains all the n^{th} roots of 1, for $n = |G|$. We determine actions of H on matrices $M_m(k)$. We obtain a complete answer when H is a Taft algebra, and partial answers for other H , in particular the Drinfeld double of the Taft algebra, for smaller matrices. Our techniques use the classification of group gradings of matrices by Bahturin, Sehgal, and Zaicev. This work is joint with Yuri Bahturin