1035-16-1827 **Miodrag Cristian Iovanov*** (`yovanov@gmail.com`), 107 Springville Ave. #1, Buffalo, NY 14226. *Generalizations of Frobenius algebras and representation theoretic proofs of fundamental results in Hopf algebras.*

An algebra A is Frobenius if $A \cong A^*$ as left (or right) A-modules. A coalgebra C is right (left) co-Frobenius if it (only) embeds in its dual as right (left) C^*-modules. Co-Frobenius is not a left-right symmetric concept, as the "Frobenius algebra" is, but yet left co-Frobenius is equivalent to right co-Frobenius for Hopf algebras. Co-Frobenius (left&right) coalgebras were recently shown to have a characterization identical to that of Frobenius algebras. We show that the more general quasi-co-Frobenius coalgebras (QcF coalgebras) also have a symmetric characterization that generalizes those of (co)Frobenius (co)algebras. Namely, C is QcF iff C is "weakly" isomorphic to its rational dual $Rat(C^*)$, on the left, or on the right, in the sense that powers of these are isomorphic. Besides generalizing the above two characterizations to a notion that was, in appearence, quite unnaturally defined, it turns out this result has unexpected applications:many equivalent characterizations of Hopf algebras with integrals (Lin, Larson, Sweedler, Sullivan), uniqueness of integrals, and the bijectivity of the antipode (Radford) follow. We thus obtain alternate proofs of fundamental results of Hopf algebras, as easy consequences of purely (co)representation theoretic methods. (Received September 20, 2007)