1112-18-11 **Adnan H Abdulwahid*** (adnan-al-khafaji@uiowa.edu), Department of Mathematics 14 MacLean Hall, Iowa City, IA 52242, and **Miodrag C Iovanov** (miodrag-iovanov@uiowa.edu), Department of Mathematics 14 MacLean Hall, Iowa City, IA 52242. *Generators for Comonoids and Universal Constructions.*

Let A be an arbitrary ring with 1. Let V be an (A, A)-bimodule. The question is does V have an A-cofree coring? Agore, A. L. mentioned this question in [1] as an open problem. My advisor and I showed that the A-cofree coring exists over an arbitrary (A, A)-bimodule V. More interestingly, we concretely construct that A-cofree coring, and used that construction to get a transparent picture for certain monoidal categories.

Let H be a bialgebra (or a Hopf algebra), and let M^H and ${}_HM$ be the left H-comodules and the right H-comodules categories, respectively. We used the construction of cofree corings that we got in our work to investigate existence and construction of cofree coalgebras in $Coalg(M^H)$ and $Coalg({}_HM)$, the category of coalgebras in M^H and ${}_HM$, respectively..

References

[1] A.L. Agore. *Limits of Coalgebras, Bialgebras and Hopf Algebras*, Proc. Amer. Math. Soc. 139, 855-863, 2011.

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