1096-16-1836 **Tyler Kloefkorn*** (tkloefko@uoregon.edu). *Splitting Algebras: Koszul and Cohen-Macaulay.*

Within a well-known class of algebras, we study a connection between noncommutative homological algebra and combinatorial topology. To a finite ranked poset Γ we associate a finite-dimensional quadratic graded algebra R_Γ. Assuming Γ satisfies a combinatorial condition known as uniform, R_Γ is the quadratic dual of the associated graded splitting algebra A'_Γ. Gelfand, Retakh, Serconek and Wilson first introduced splitting algebras and a subset of these authors showed that a splitting algebra A_Γ is quadratic if Γ is uniform. Given a uniform Γ, we then ask a standard question in noncommutative homological algebra: Does A_Γ satisfy the Koszul property? Applying standard techniques and assuming the uniform hypothesis, it is known that if R_Γ is Koszul, then so is A_Γ. We therefore study Koszulity of R_Γ in search of necessary and sufficient conditions on Γ. We have found that the Koszulity of R_Γ is related to a combinatorial topology property of Γ known as Cohen-Macaulay. This property is ubiquitous and it often connects the fields of algebra and topology. We prove: Γ is Cohen-Macaulay if and only if Γ is uniform and R_Γ is Koszul. (Received September 16, 2013)