Tyler Kloefkorn\textsuperscript{*} (tkloefkorn@math.arizona.edu). Weakly Cohen-Macaulay posets and a class of finite-dimensional Koszul algebras.

Given a finite ranked poset $\Gamma$, we study an associated finite-dimensional graded quadratic algebra, $R_{\Gamma}$. Assuming $\Gamma$ satisfies a combinatorial condition known as uniform, $R_{\Gamma}$ is related to a well-known algebra, the splitting algebra $A_{\Gamma}$. Splitting algebras were first introduced by Gelfand, Retakh, Serconek, and Wilson, and they originated from the problem of factoring non-commuting polynomials. We ask: Is $R_{\Gamma}$ Koszul? The Koszulity of $R_{\Gamma}$ is related to the Cohen-Macaulay property of $\Gamma$. Kloefkorn and Shelton proved that if $\Gamma$ is a finite ranked cyclic poset, then $\Gamma$ is Cohen-Macaulay if and only if $\Gamma$ is uniform and $R_{\Gamma}$ is Koszul. We define a new generalization of Cohen-Macaulay, weakly Cohen-Macaulay. We prove: if $\Gamma$ is a finite ranked cyclic poset, then $\Gamma$ is weakly Cohen-Macaulay if and only if $R_{\Gamma}$ is Koszul. (Received July 19, 2016)