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**Hal Schenck, Mike Stillman** and **Beihui Yuan\*** (by238@cornell.edu), 120 Malott, Cornell University, Ithaca, NY 14853. *Calabi-Yau threefolds in projective spaces and Gorenstein rings.*

A projectively normal Calabi-Yau threefold  $X$  in projective spaces has an ideal  $I_X$  which is arithmetically Gorenstein, of Castelnuovo-Mumford regularity four. Such ideals have been intensively studied when  $I_X$  is a complete intersection, as well as in the case where  $X$  is codimension three. In the latter case, the Buchsbaum-Eisenbud theorem shows that  $I_X$  is given by the Pfaffians of a skew-symmetric matrix. A number of recent papers study the situation when  $I_X$  has codimension four. We prove there are 16 possible Betti diagrams for an arithmetically Gorenstein ideal  $I$  with  $\text{codim}(I) = 4 = \text{reg}(I)$ , and that exactly 8 of these occur for smooth irreducible nondegenerate threefolds. (Received August 08, 2021)