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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 $\operatorname{codim}(I) = 4 = \operatorname{reg}(I)$, and that exactly 8 of these occur for smooth irreducible nondegenerate threefolds. (Received August 07, 2021)