The cubic algebra $A$ generated by the covariant derivatives of a Yang-Mills connection over the $(s + 1)$-dimensional pseudo-Euclidean space is Koszul of global dimension 3 and Gorenstein (Theorem 1) except in the two-dimensional case ($s = 1$) where it is the universal enveloping algebra of the Heisenberg Lie algebra and a cubic Artin-Schelter regular algebra [see R. Berger, J. Algebra 239, 705-734 (2001; Zbl 1035.16023)]. An explicit formula for the Poincaré series of $A$ and for the dimension in degree $n$ of the corresponding graded Lie algebra is given. In the four-dimensional Euclidean case ($s = 3$) a quotient of $A$ is the quadratic algebra generated by a self-dual connection. This algebra is Koszul of global dimension 2 but is not Gorenstein (Theorem 2). It is the universal enveloping algebra of the semi-direct product of the free Lie algebra with three generators of degree 1 by a derivation of degree 1 [see also M. Dubois-Violette, K-Theory 14, 371-404 (1998; Zbl 0918.18008), M. Dubois-Violette and I. T. Todorov, Lett. Math. Phys. 48, 323-338 (1999; Zbl 0949.81067), and M. Wambst, K-Theory 23, 377-397 (2001; Zbl 0996.18011)].

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