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Representation theory of three-dimensional Sklyanin algebras

Chelsea Walton

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We determine the dimensions of the irreducible representations of the Sklyanin algebras with global dimension 3. This contributes to the study of marginal deformations of the N=4 super Yang-Mills theory in four dimensions in supersymmetric string theory. Namely, the classification of such representations is equivalent to determining the vacua of the aforementioned deformed theories.

We also provide the polynomial identity degree for the Sklyanin algebras that are module finite over their center. The Calabi-Yau geometry of these algebras is also discussed.

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