

## SEMINARIO DE GEOMETRIA ALGEBRAICA

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**Aline V. Andrade**

Universidad de Campinas

Impartirá la conferencia

### Orthogonal instanton bundles on $\mathbb{P}^3$

This is a joint work with Simone Marchesi and Rosa María Miró Roig. The study of vector bundles in projective varieties has been a topic of great interest in algebraic geometry, see for instance Hartshorne problems list in [5]. In this talk we concentrate on orthogonal instanton bundles.

The instanton bundles are an important link between mathematical physics and algebraic geometry, once over  $\mathbb{P}^3$  the instanton bundles are related with solutions of the Yang Mills equations on 4-dimensional sphere  $S^4$ , which is how they were first introduced by Atiyah, Drinfeld, Hitchin and Manin in 1978 (see [1]). Since their generalization in algebraic geometry by Okonek and Spindler in [8] the study of this family of bundles and its moduli spaces arouses great interest in the mathematical community. In [7], Jardim, Marchesi and Wissdorf study the moduli of autodual instanton bundles and show that there are no orthogonal instanton bundles of trivial splitting type with odd charge on  $\mathbb{P}^n$ . And as Farnik, Frapporti and Marchesi proved in [4] there are no orthogonal instanton bundles of rank  $2n$  on  $\mathbb{P}^{2n+1}$ . In light of this results, is interesting to obtain criteria of existence of orthogonal instanton bundles of higher rank.

In our work we provide a bijection between equivalence classes of orthogonal instanton bundles on  $\mathbb{P}^3$  and symmetric forms. Using such correspondence, we prove the non-existence of orthogonal instanton bundles with no global sections on  $\mathbb{P}^3$ , with second Chern class equal to one or two. We also prove that an orthogonal instanton bundles with no global sections and second Chern class equal to  $n$  on  $\mathbb{P}^3$  has rank  $2n$ . And using Macaulay2 we constructed explicit examples of such bundles for  $n \geq 3$ .

# Referencias

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