



Σεμινάριο Γεωμετρίας

**The hyperkähler structure on the cotangent bundle of  $SL(2, \mathbb{C})$**

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**Περίληψη**

Hyperkähler manifolds have several analytic and algebraic properties making them accessible for description but difficult to construct. A construction of P. Kronheimer [3] gives an example of hyperkähler structure abstractly constructed on the cotangent bundle  $T^*G_{\mathbb{C}}$  of the complex Lie group  $G_{\mathbb{C}}$  corresponding to a compact Lie group  $G$ . This hyperkähler structure emerges through infinite dimensional reduction (hyperkähler reduction) of the space of solutions of the so-called "Nahm's equations", and so its description is particularly difficult even for basic Lie groups. We present a partial description of the family of Kähler structures on  $G_{\mathbb{C}}$  as complex submanifold of  $T^*G_{\mathbb{C}}$  in the general case, extending a result of Stenzel [5] for homogeneous spaces. We then focus on  $G = SU(2)$ , for which  $G_{\mathbb{C}} = SL(2, \mathbb{C})$ ; our calculation, method and results partially generalize a calculation of Dancer [1]. This is work in collaboration with Richard B. Melrose (MIT) and Michael Singer (UCL).

- [1] A. Dancer, Nahms equations and hyperkähler geometry. *Comm. Math. Phys.* 158(3): 545-568 (1993).
- [2] F. Kirwan, Symplectic quotients of unstable Morse strata for norm-squares of moment maps. Preprint, arXiv:1802.09237.
- [3] P.B. Kronheimer, The hyperkähler structure on the cotangent bundle of a complex Lie group. MSRI preprint (1998).
- [4] G. Patrizio & P.M. Wong, Stein manifolds with compact symmetric center. *Math. Ann.* 289 (3), 355-382 (1991).
- [5] M. Stenzel, Ricci-flat metrics on the complexification of a compact rank one symmetric space. *Manuscripta Math.* (80), 151-163 (1993).

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