Instanton Sheaves and Complex Instantons

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Instanton bundles were introduced by Atiyah, Drinfeld, Hitchin and Manin in the late 1970s as the holomorphic counterparts, via twistor theory, to anti-self-dual SU(r) connections (a.k.a. instantons) on the sphere $S^4$. We will revise the ADHM construction of instanton sheaves on $\mathbb{C}P^3$, along with some recent results regarding the basic geometrical features of their moduli spaces. We will describe the singular loci of instanton sheaves, and how these lead to new irreducible components of the moduli space of stable sheaves on the projective space. Finally, we outline the construction of the corresponding SL($r, \mathbb{C}$) instanton connections of $\mathbb{R}^4$. 