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Twistors, Hyper-Kähler Manifolds, and Complex Moduli

A theorem of Kuranishi guarantees that the moduli space of complex structures on any smooth compact manifold is locally a finite-dimensional space. Globally, however, this finite-dimensionality can fail. Indeed, I will describe examples in which the moduli space contains a sequence of regions for which the local dimension tends to infinity. These examples, which naturally arise from the twistor theory of hyper-Kähler manifolds, also display other surprising behaviors. I will highlight several of these, and put the entire story in a context that contrasts high-dimensional complex manifolds with complex surfaces, and non-Kähler manifolds with complex algebraic varieties.