A zoo of complex, symplectic, non Kähler manifolds

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Abstract: Every Kähler manifold has an underlying symplectic structure. Forty years ago Thurston provided the first example of a compact symplectic manifold which admits no Kähler metrics. Giving examples of such manifolds is a twofold problem: one needs techniques to construct compact symplectic manifolds and, then, has to make sure that the constructed manifold has no Kähler structures whatsoever. Every Kähler manifold also has the structure of a complex manifold. A trickier question is then to construct examples of manifolds which are simultaneously complex and symplectic, but admit no Kähler metrics.

In this talk we report on the known examples of manifolds which are complex and symplectic, however carry no Kähler metric. We present the construction of a six dimensional simply connected, compact, symplectic and complex manifold which admits no Kähler structures.

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