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Calabi-Yau manifolds

Definition. Calabi-Yau manifolds

A **Calabi-Yau manifold** is a compact Kahler manifold

$$(M, J, g)$$

such that either one of the following equivalent conditions occur

- $\text{Ric}(g) = 0$
- $c_1(M) = 0$
- $\text{Hol}(g) \subseteq SU(n)$
- the canonical bundle K_M is trivial
- there is a global, non-vanishing $(n, 0)$ -form

$\dim_{\mathbb{C}}$	name
1	Calabi-Yau elliptic curve
2	K3 surface
3	Calabi-Yau 3-fold

Hodge diamond

Proposition: The Hodge diamond of a Calabi-Yau 3-fold looks like

$$\begin{array}{ccccc} & & 1 & & \\ & & 0 & & 0 \\ & 0 & & h^{1,1} & & 0 \\ 1 & & h^{2,1} & & h^{2,1} & & 1 \\ & 0 & & h^{1,1} & & 0 \\ & & 0 & & 0 & & \\ & & & & 1 & & \end{array}$$

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