

Tsimerman on Hodge and GAGA

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Hodge structures:

 $X = \text{smooth projective variety} / \mathbb{C}$

$$H_{DR}^*(X) = (\text{closed}) / (\text{exact}) = \bigoplus_{i=0}^n H_{DR}^{i, n-i}(X)$$

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 $H^n(X, \mathbb{C}) = \text{sheaf cohomology w/ coeff in } \mathbb{C}$ $H^n(X, \mathbb{Z})$ (only torsion free part)Def A Hodge structure of wt n :* a \mathbb{Z} -lattice L

$$* L \otimes \mathbb{C} = \bigoplus_{i=0}^n L^{i, n-i} \quad \text{w/} \quad \overline{L^{i, n-i}} = L^{n-i, i}$$

eg. An elliptic curve can be recovered from its Hodge structure:

$$X \cong \frac{H_{DR}^{1,0}(X)}{\text{im } H^1(X, \mathbb{Z})}$$

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