$$\Sigma \text{ elliptic}$$

$$Z_H = \Sigma \times B$$

$$Z_F = K3 \times B$$

$$\frac{\text{het}}{\text{ell } \times B} = \frac{\text{F theory}}{K3 \times B}$$

dualities

$$\mathbb{T}^2 \to K3 \to \mathbb{P}^1$$

$$F_{12}\left(K3\right) = \text{HET}_{10}\left(\mathbb{T}^2\right)$$

$$\text{HET}_{10}\left(\mathbb{T}^4\right) = F_{12}\left(K3 \times \mathbb{T}^2\right) = M_{11}\left(K3 \times \mathbb{T}\right) = \text{IIA}_{10}\left(K3\right)$$

$$\begin{cases} \mathbb{T}^2 \\ K3 \end{cases} \to CY_3 \to \begin{cases} B^2 \\ \mathbb{P}^1 \end{cases} \quad \text{both fibrations}$$

$$F_{12}\left(CY_3\right) = \text{HET}_{10}\left(K3\right)$$

$$\text{HET}_{10}\left(K3 \times \mathbb{T}^2\right) = F_{12}\left(CY_3 \times \mathbb{T}^2\right) = M_{11}\left(CY_3 \times \mathbb{T}\right) = \text{IIA}_{10}\left(CY_3\right)$$

$$CY_3 \to CY_4 \to \mathbb{P}^1$$

$$F_{12}\left(CY_4\right) = \text{HET}_{10}\left(CY_3\right)$$

$$\text{HET}_{10}\left(CY_3 \times \mathbb{T}^2\right) = F_{12}\left(CY_4 \times \mathbb{T}^2\right) = M_{11}\left(CY_4 \times \mathbb{T}\right) = \text{IIA}_{10}\left(CY_4\right)$$

$$M_{11}\left(CY_3 \times \mathbb{T}\right) \begin{cases} D = 4 \\ N = 1 \end{cases} \quad \text{sugra}$$

$$\text{N parallel N5-branes } \underset{T}{\simeq} \text{ ALF hyperKahler metric } A_{N-1} \text{ singularity}$$

$$\text{N5-brane } \underset{T}{\simeq} \text{ ALF hyperKahler metric } A_0 \text{ singularity TaubNUT}$$