

IIB massless branes

9+branes

$$1+\text{brane} \int_{\Sigma^2} B_{\mu\nu} \varepsilon^{\alpha\beta} \underbrace{\partial_{\alpha_0} \mathbb{1}^\mu}_{\mathbb{1}^\mu} \underbrace{\partial_{\beta_0} \mathbb{1}^\nu}_{\mathbb{1}^\nu}$$

$$k = 1B$$

$$\mathbb{4}: \begin{array}{ccc} 1|1 & 3|3 & -1|-1 \\ 5|5 & 3|3 & 7|7 \end{array}$$

$$\text{Pic } \mathbb{P}^1 \times \mathbb{P}^1 = \mathbb{Z} \langle L_1 : L_2 \rangle$$

min pos roots

$$\alpha_0 = L_1 - L_2 = 1|-1$$

$$\alpha_1 = L_2 = 0|1$$

$$-K = 2L_1 + 2L_2 = 2|2$$

$$N \frac{1}{5} = \frac{L_1}{L_1 + 2L_2} \begin{cases} M_2/s = F_1 \\ K_6/s = N_5 \end{cases}$$

$$D \frac{1}{5} = \frac{L_2}{2L_1 + L_2} \begin{cases} M_2/9 = D_1 \\ K_6/9 = D_5 \end{cases}$$

$$D \frac{3}{3} = \frac{L_1 + L_2}{L_1 + L_2} \begin{cases} M_5/s9 = D_3 \\ \text{self} \end{cases}$$

$$D \frac{-1}{7} = \frac{L_2 - L_1}{3L_1 + L_2} \begin{cases} M_2/s9 = K_1 \\ M_5/0 = K_5 \end{cases}$$

$$N \frac{-1}{7} = \frac{L_1 - L_2}{L_1 + 3L_2}$$

pos roots

$$0 \text{ form } 0|0 = | \left\{ \varphi \right.$$

$$0 \text{ form } \alpha_1 = 0|1 \left\{ \begin{array}{l} \emptyset \\ D_{-1}^+ \end{array} \right. \text{ axion}$$

$$2 \text{ form } \alpha_0 = 1| - 1 \left\{ \begin{array}{l} \mathcal{Z} \\ F_1^+ \end{array} \right.$$

$$2 \text{ form } \alpha_0 + \alpha_1 = 1|0 \left\{ \begin{array}{l} \mathcal{Q} \\ D_1^+ \end{array} \right.$$

$$4 \text{ form } 2\alpha_0 + \alpha_1 - 1 \left\{ \begin{array}{l} \mathcal{A} \\ D_3^+ \end{array} \right.$$

$$6 \text{ form } 3\alpha_0 + \alpha_1 = 2|0 \left\{ \begin{array}{l} \overline{\mathcal{Q}} \\ D_5^+ \end{array} \right.$$

$$6 \text{ form } 3\alpha_0 + 2\alpha_1 = 3| - 2 \left\{ \begin{array}{l} \overline{\mathcal{Z}} \\ NS_5^+ \end{array} \right.$$

$$8 \text{ form } 4\alpha_0 + \alpha_1 = -K = 3| - 1 \left\{ \begin{array}{l} \overline{\mathcal{Q}} \\ D_7^+ \end{array} \right.$$

$$8 \text{ form } 4\alpha_0 + 2\alpha_1 = 4| - 3 \left\{ \begin{array}{l} \psi \end{array} \right.$$

$$8 \text{ form } 4\alpha_0 + 3\alpha_1 = 4| - 3 \left\{ \begin{array}{l} NS_7^+ \end{array} \right.$$