Symmetric fluxes and small tadpoles

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The Tadpole Conjecture

Conjecture: [Bena, Blåbäck, Graña, Lüst '20]

$$N_{\text{flux}} > \alpha \, n_{\text{stab}} \quad \text{for} \quad n_{\text{stab}} \gg 1 \quad \text{with} \quad \alpha = \mathcal{O}(1)$$

Refined bound:
$$\alpha \geq \tfrac{1}{3}$$

D3-charge:
$$N_{\text{flux}} \leq -Q_{\text{D3}}$$

Deep interior

- Vacua at symmetric loci of moduli space in F-theory

$\to N_{\text{flux}}/n_{\text{stab}} = 0.003$

Large complex structure

???

Strict asymptotic regime
- Use of $sl(2)$ decomposition
$\to N_{\text{flux}} > 0.7 \, n_{\text{stab}}$

[Grimm, Plauschinn, van de Heisteeg '22]
[Graña, Grimm, van de Heisteeg, Herraez, Plauschinn '22]

[Lüst, Wiesner '22]

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- Axio-dilaton + CS sector

- Three-form fluxes:

$$\left(\int_{B^I} F_3, \int_{A_I} F_3 \right) = (f_0^B, f_i^B, f_A^0, f_A^i) \quad | \quad H_3 : \ (h_0^B, h_i^B, h_A^0, h_A^i)$$

IIB1 flux configuration: $f_A^0 = 0$, $h_A^0 = 0$ and $h_A^i = 0$
[Marchesano, Prieto, Wiesner '21]

W is quadratic $\implies$ simple linear system for axions + saxions
[TC, Marchesano, Prieto, Urkiola '22]

Exploit eqs structure:

$\implies$ Efficiently scan flux space $\longrightarrow$ Solutions in the LCS regime

Type IIB flux compactifications and IIB1 scenario

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Geometry:

$T^6/(\mathbb{Z}_2 \times \mathbb{Z}_2)$ with discrete torsion $\rightarrow$ $h^{2,1} = 51$

Symmetric fluxes and vevs:

Reduce # of variables

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Large complex structure

- Our vacua with even fluxes
$\rightarrow N_{\text{flux}}/n_{\text{stab}} \geq 0.337$

- With potential lifted D7 moduli
$\rightarrow N_{\text{flux}}/n_{\text{stab}} \geq 0.1675$

- Allow odd flux quanta
$\rightarrow N_{\text{flux}}/n_{\text{stab}} \geq 0.084$

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Thank you for your attention!

Papers: 2212.02533 and 2304.04789