

5d SCFTs

+

non-SUSY cousins

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($E_{6,7,8}$ "T" or "Y")

Based on [hep-th/2307.13724]

w/ M. Zlotnik + J. Mognon

stray coupling is hard!

① Old ideas fuzzy

↳ Event results

↳ Dualities

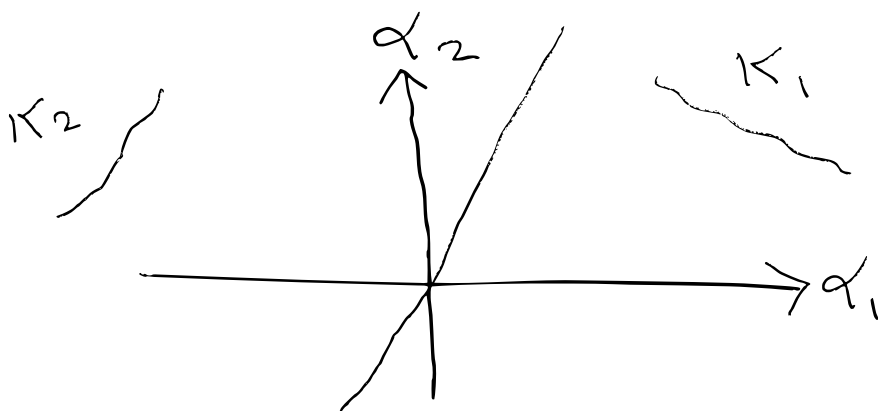
② Recent ideas SPT

QFT w/ global symmetry

$$G \xrightarrow{\text{gauge it}} A$$

Fact. Topological couplings are robust under RG.

E.g. $S_{CS} = \frac{K}{4\pi} \int A dA; K \in \mathbb{Z}$



$$\Delta K = K_1 - K_2 \neq 0 \Rightarrow \text{Phase transition}$$

This talk:

① → SUSY QFT

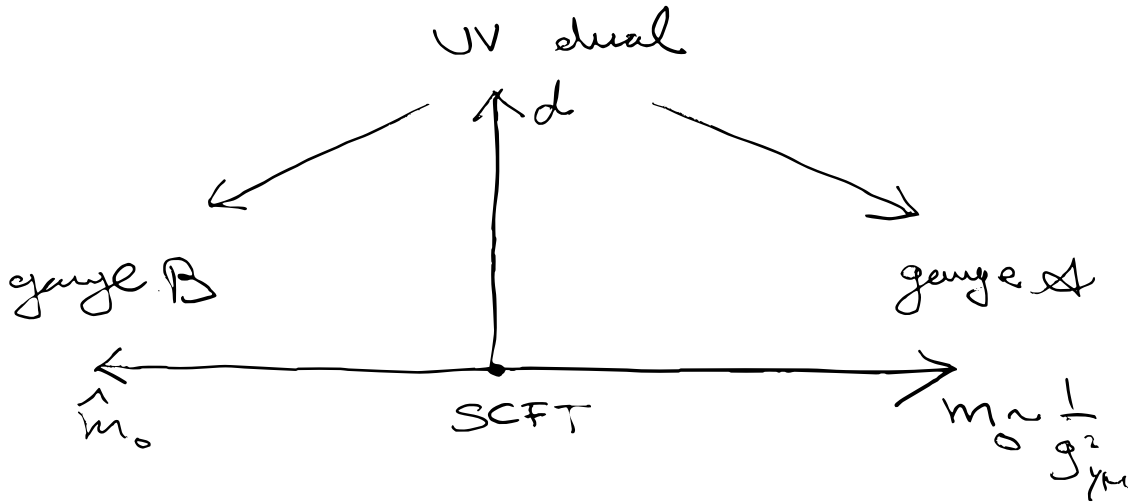
RG

② → ~~SUSY~~ QFT

Q: Are there interacting CFTs w/out
SUSY in $d > 4$?

Hint: \exists many SCFTs in $d = 5$

5d SCFTs



$$J_I = \frac{1}{8\pi^2} * \text{Tr}(F \wedge F)$$

$$\delta \mathcal{L} = i A_I \wedge * J_I + \dots$$

$$V_I = (\phi_I, \lambda_I, A_\mu^I, D^I)$$

$$m_0 \sim \langle \phi_I \rangle \cdot d \sim \langle D^I \rangle$$

Goal: Compute $\Delta \mathcal{K}_I = \mathcal{K}_I^{(A)} - \mathcal{K}_I^{(B)}$

5d Coulomb Branches

$$V = (\phi, \lambda, A_\mu, D)$$

$$G \xrightarrow{\langle \phi \rangle} U(1)^{\text{Rank}(G)}$$

$$\underbrace{g_{ij}} F_i \wedge * F_j + \dots$$

C.B. metric

$$\text{in 5d} \quad F_i \longleftrightarrow *_5 \underbrace{H_i}_{dB_i^{(2)}}$$

C. B. Spectrum

Electric Particles
(mass)

(P, q) string junction
(length)

Magnetic Strings
(tension)

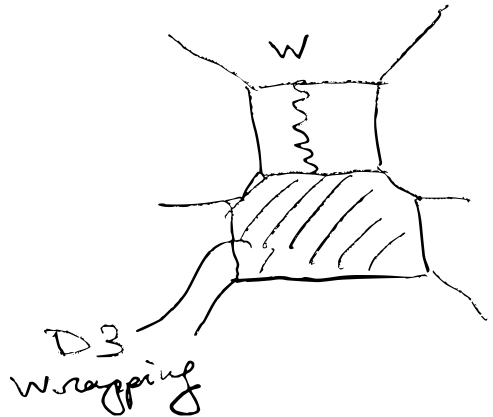
D3 wrapping
(Area)

Prepotential

$$\mathcal{F}(\phi_i, m_o, m_j)$$

$$\frac{\partial^2 \mathcal{F}}{\partial \phi_i \partial \phi_j} = S_{ij}$$

$$\frac{\partial \mathcal{F}}{\partial \phi^i} = T_i$$



← solve for \mathcal{F}



Integration
constants

$$F = F_{IMS} + \sum_{A,B,C} \alpha_{ABC} m^A m^B m^C$$

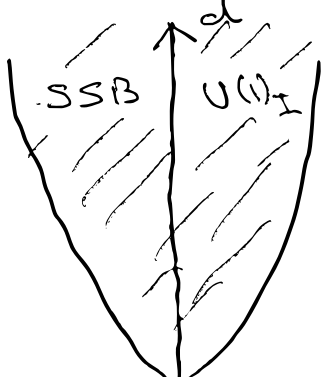
$$m^A = (m_0, m_j)$$

→ use UV-duality to fix α_{ABC}

Example: Rank- N E_1 theory

$$Sp(N) + B\phi + B\psi$$

$$\chi_I = 4N$$



$$Sp(N) + B\phi + B\psi$$

$$\chi_I = -4N$$

$$m_0$$

$$Sp(N) + 1AS$$

$$E_1^{(N)}$$

$$Sp(N) + 1AS$$

Outlook

1. Holography
($AdS_6 \times S^4$) [Brandhuber
+ Oz.]

2. Generalized anomalies

3. 6d SCFT on $S^1 \rightarrow 5d$ KK

ありがとう

ごさします。