ABCD of 4d/2d Correspondence

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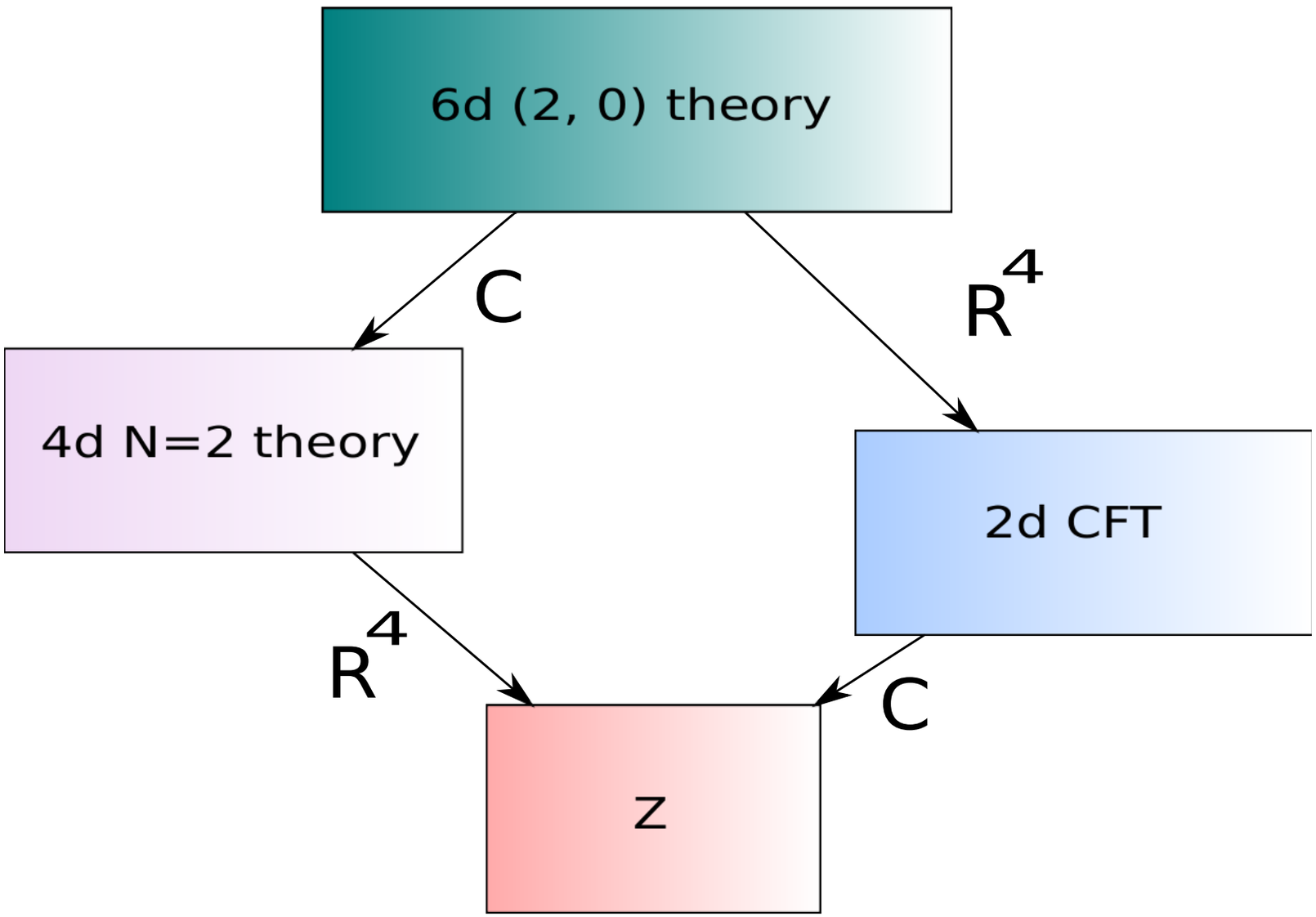
Jaewon Song
California Institute of Technology

based on arXiv:1012.4468,1107.0973
with L. Hollands and C. Keller

AGT correspondence

- $Z_{4d}(\mathcal{C}, a, m, \epsilon) = Z_{2d}(\mathcal{C}, h_a, h_m, c)$
- 4d: N=2 Generalized quiver gauge theories T(C) of A_N type
- 2d: Liouville/Toda theory on C
- Nekrasov Partition function on $\mathbb{R}^4_{\epsilon_1,\epsilon_2}$ or S^4 = Correlation function
- Chiral/Full

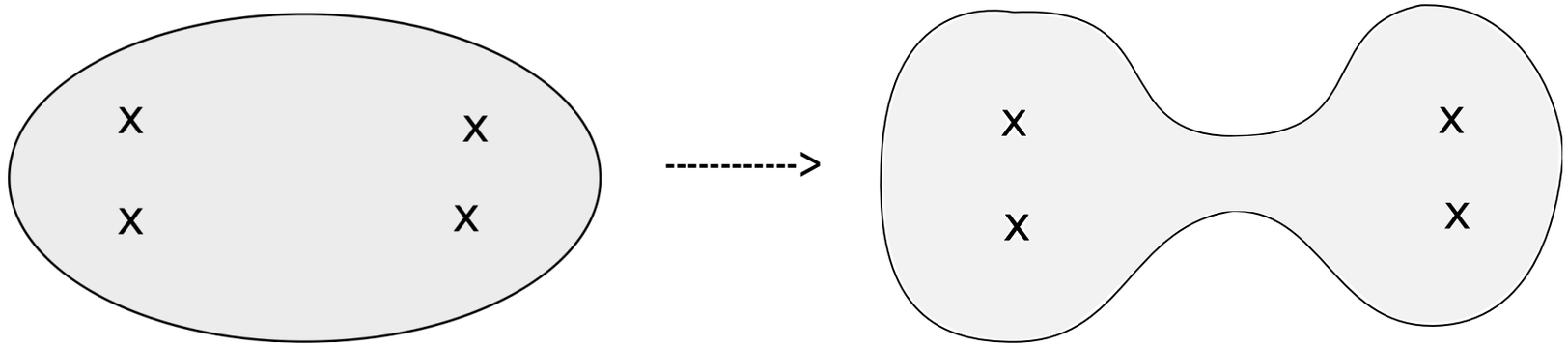
Why?

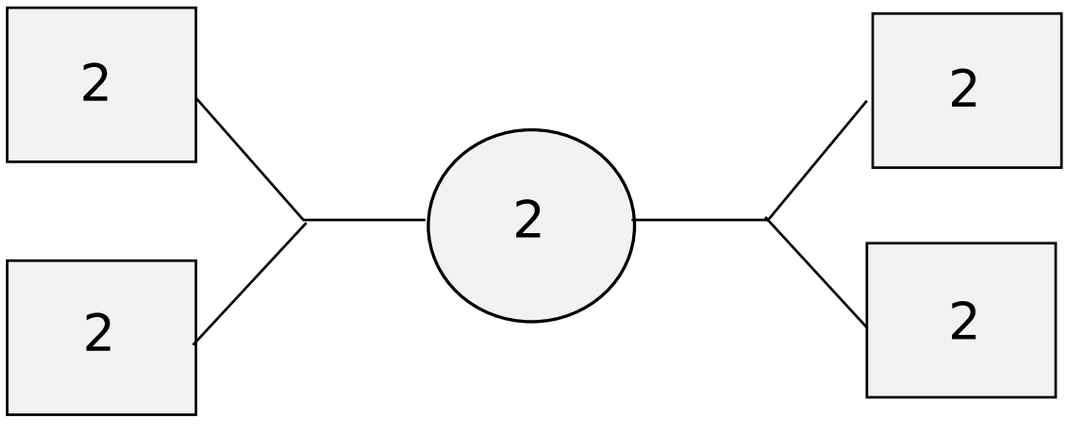


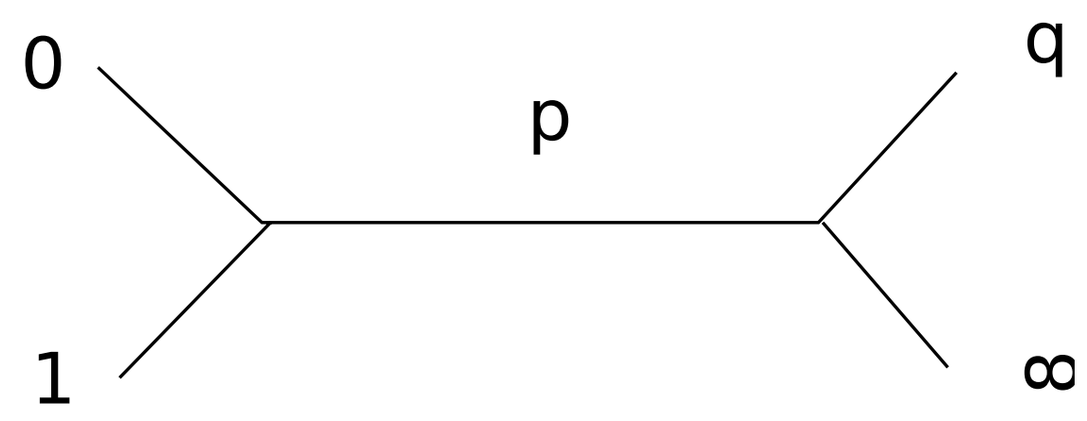
The theories of class S

- Pick a ‘gauge’ group G=A, D, E.
- Riemann surface C, possibly with punctures.
- Punctures are decorated according to the choice of G.
- A pair of pants decomposition gives a weakly coupled description of the theory.

Riemann surface to quiver/conformal block

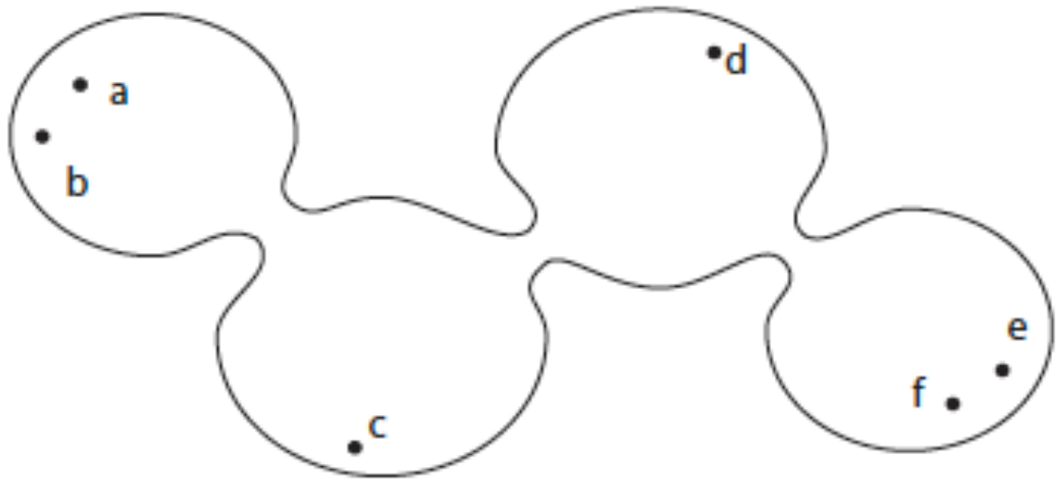


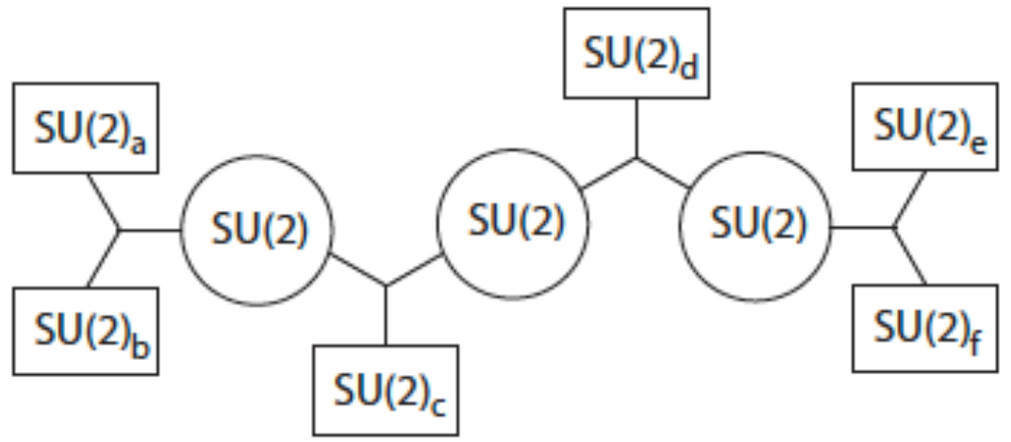


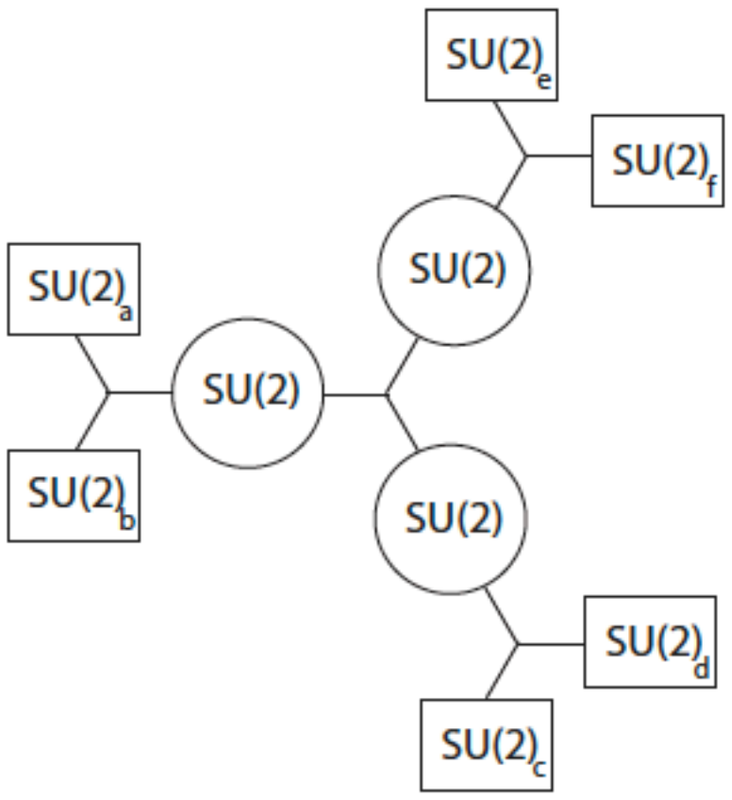


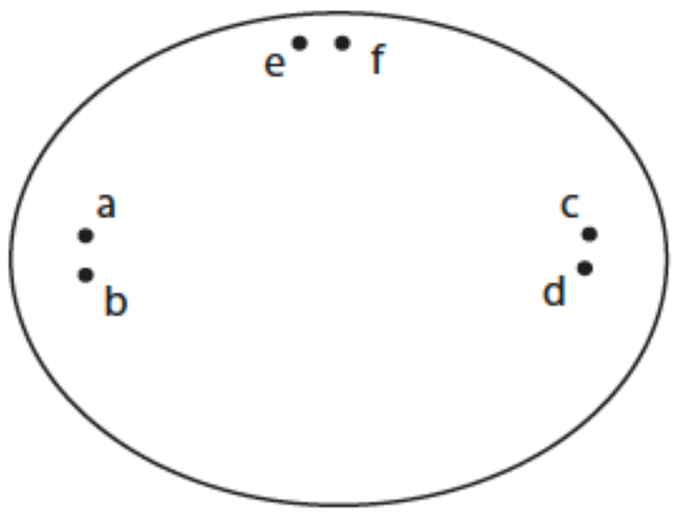
Generalizing AGT

- A_N (N>1) theories [Mironov-Morozov[2]], [Wyllard]
- Non-conformal cases [Gaiotto], [Taki]
- Insertion of non-local BPS operators [AGGTV], [DGG], ...
- D_N theories [Hollands-Keller-JS]
- A_1 Sicilian theories [Hollands-Keller-JS]


a
b
c
d
e
f


SU(2)a
SU(2)b
SU(2)
SU(2)c
SU(2)
SU(2)d
SU(2)
SU(2)e
SU(2)f


SU(2)e
SU(2)f
SU(2)
SU(2)a
SU(2)
SU(2)b
SU(2)
SU(2)d
SU(2)c

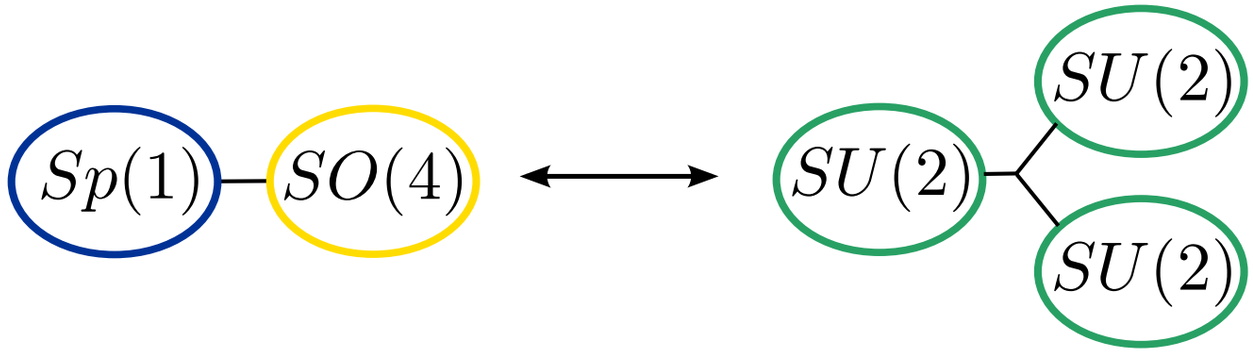

e
f
a
b
c
d

Trifundamental (T2)

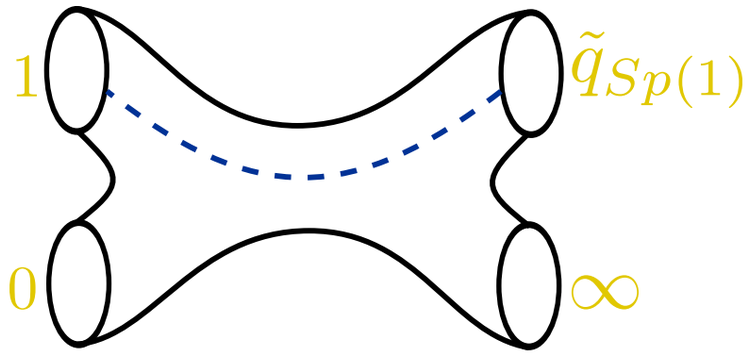
- It's a Half-hypermultiplet.
  - Same matter content as a N=1 chiral multiplet
  - Has to be massless
  - Consistent only if it's in a pseudo-real representation of the gauge group

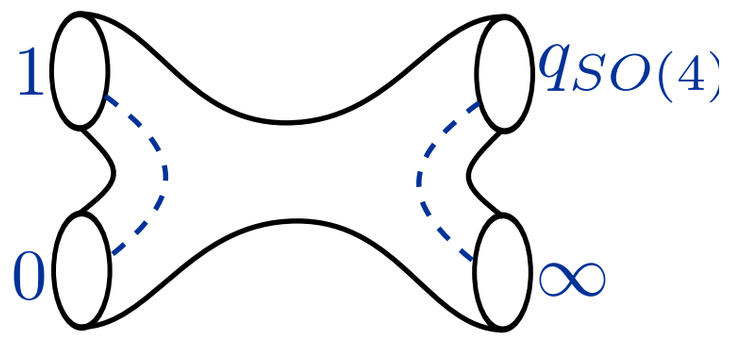
The three roads to trifundamentals

- $U(2)^3$: Not pseudo-real. Can't use it.
- $Sp(1)^3$: No direct G-curve realization
- Sp(1)xSO(4): Can't probe full parameter space



D_N-Theories of class S





- G=SO(2N) theories
- Can also realize G=Sp(N-1), SO(2N-1)
- SO-Sp quivers
- D2: SO(4), Sp(1), SO(3)

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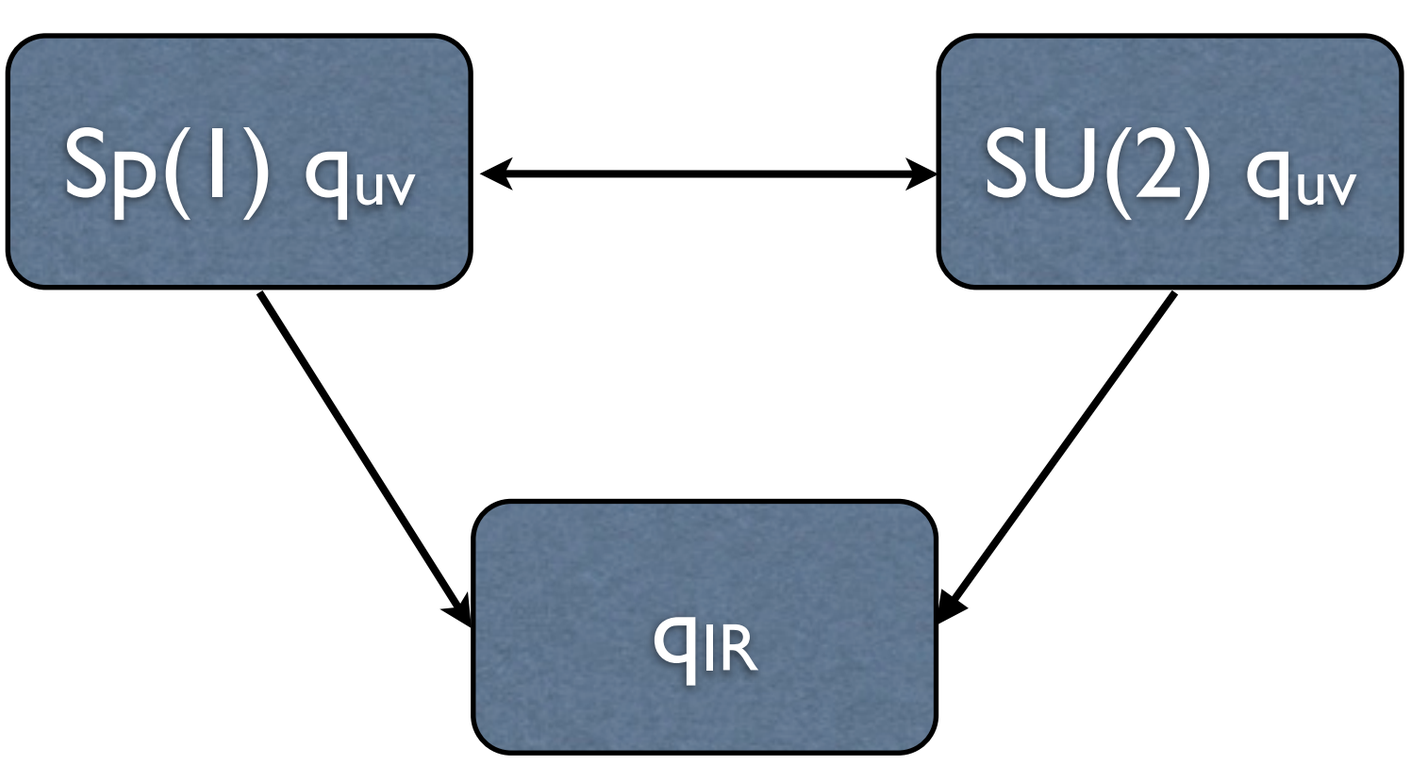
- Instanton counting with Sp-SO, $Sp(1)^3$ Half-hypermultiplets
- Z_2-automorphism of $W(D_n)$-algebra
- Asymmetry of the conformal block for the trifundamental

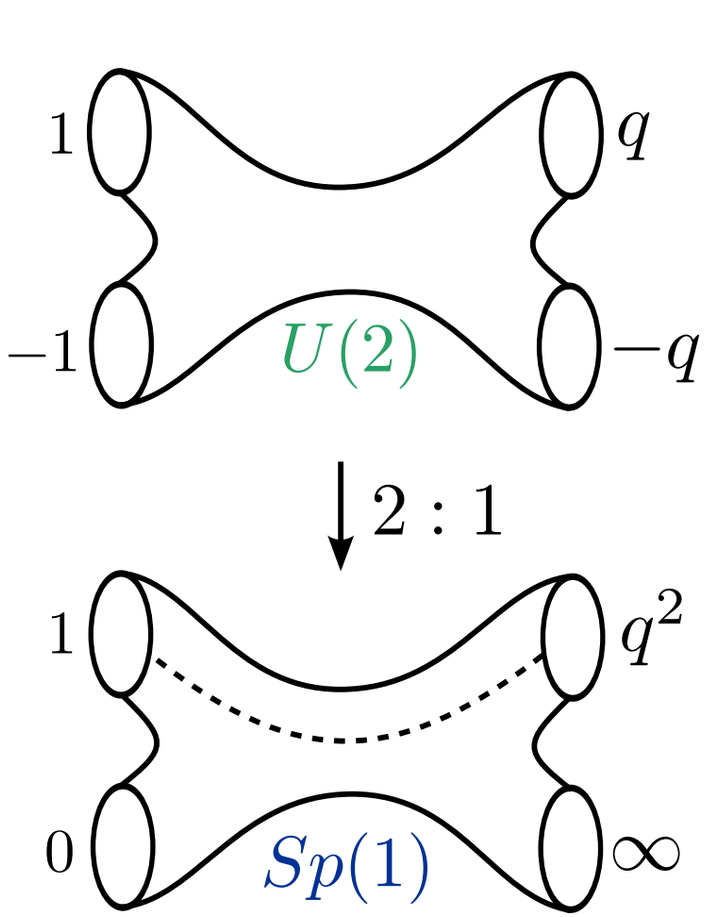
Summary

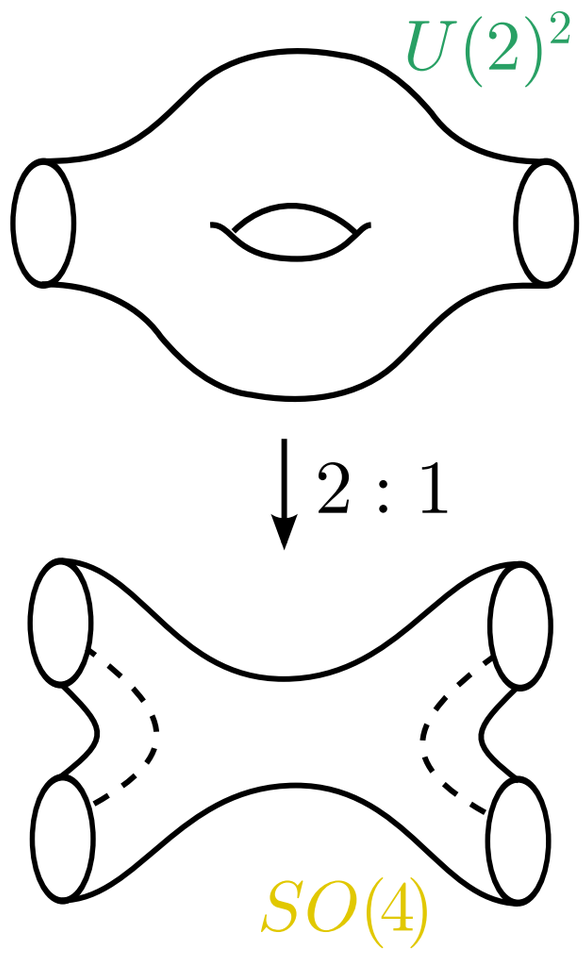
- The Nekrasov partition function for the different realization of the same theory agrees once it's written in terms of IR variables. (QFT lesson 101)



Summary

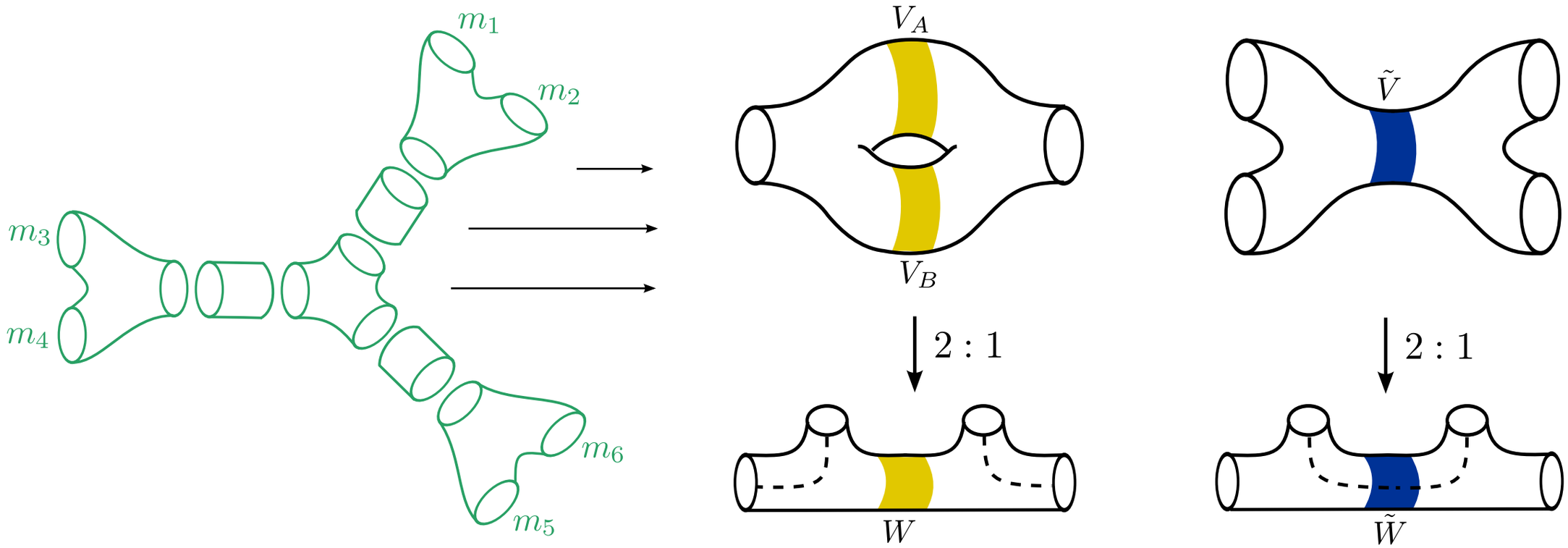
- UV-UV map between parameters can be understood geometrically in terms of a map between the moduli spaces of Gaiotto curves.





Summary

- AGT correspondence is extended and tested to the D-series and Sicilian quivers with bi/trifundamental half-hypers.



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