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Theme of the work

Study Ω -background in \mathcal{N} = 2 SYM via string theory

• What is Ω -background ?

In Nekrasov's calculation of instanton partition function, some deformations of the $\mathcal{N}=2$ SYM is considered.

- Introduce noncommutative parameters
 - → Resolve the singularity of the instanton moduli space
- Introduce Ω -background (graviphoton background)
 - → Isolated fixed pts for deformed SUSY operator on the instanton moduli space
- → We can perform the integral of instanton moduli action on the instanton moduli space using the localization formula.
- → Obtain instanton partition function

Want to apply the methods of instanton calculus to many other theories.

- → Interpret in terms of String theory
- High dimensional instantons
 D6/D0 system [Jafferis]
 D7/D(-1) system [Billo-Ferro-Frau-Gallot-Lerda-Pesando]
- Instantons in quiver type gauge theory
- Field theories with more or less SUSY

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The Ω -background deformations are described by closed string backgrounds.

Computing the partition function of topological closed string

→ The higher-genus correction of the partition function corresponds to the self-dual graviphoton background.

[Antoniadis-Gava-Narain-Taylor]

D3/D(-1)-branes and self-dual RR 3-form flux (orbifolded spacetime) $\rightarrow \mathcal{N}=2$ Instanton moduli action deformed by self-dual Ω -background [Billo-Frau-Fucito-Lerda]

... Self-dual part of the background has been well studied.

Recently there are many works on non-self-dual Ω -background.

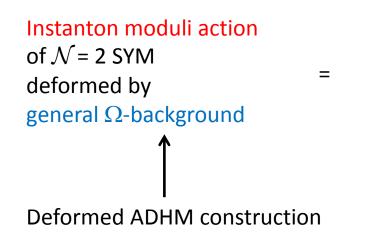
Topological closed string with non-self-dual graviphoton background

→ "Refinement" of the topological string
[Iqbal-Kozcaz-Vafa , Taki , ...]

Non-self-dual Ω -background deformation of \mathcal{N} = 2 SYM \rightarrow Related with some integrable systems [Nekrasov-Shatashvili , Mironov-Morozov , ...]

What corresponds to general (non-self-dual) Ω -background deformation at the level of instanton moduli action ?

Main result of our work



D(-1)-brane effective action of D3-D(-1) system in orbifolded spacetime deformed by Some type of R-R 3-form

Computation of string amplitudes connecting R-R and D(-1)

In order to keep SUSY, we have to introduce R-sym. Wilson line.

... Also reproduced in string theory considering other type of R-R 3-form