

# Tensionless strings on $AdS_3$ orbifolds

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Strings Gong Show

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Based on arXiv: 2312.01348 and wip with M. R. Gaberdiel and S. D. Mathur

# Tensionless strings on $AdS_3$

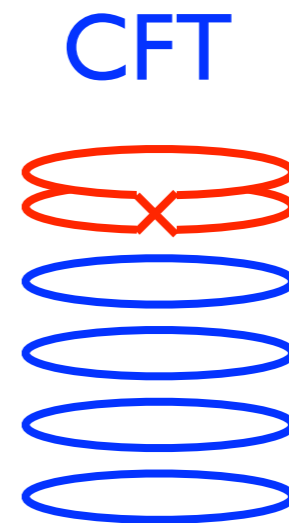
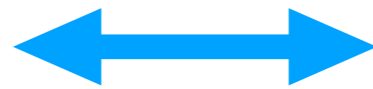
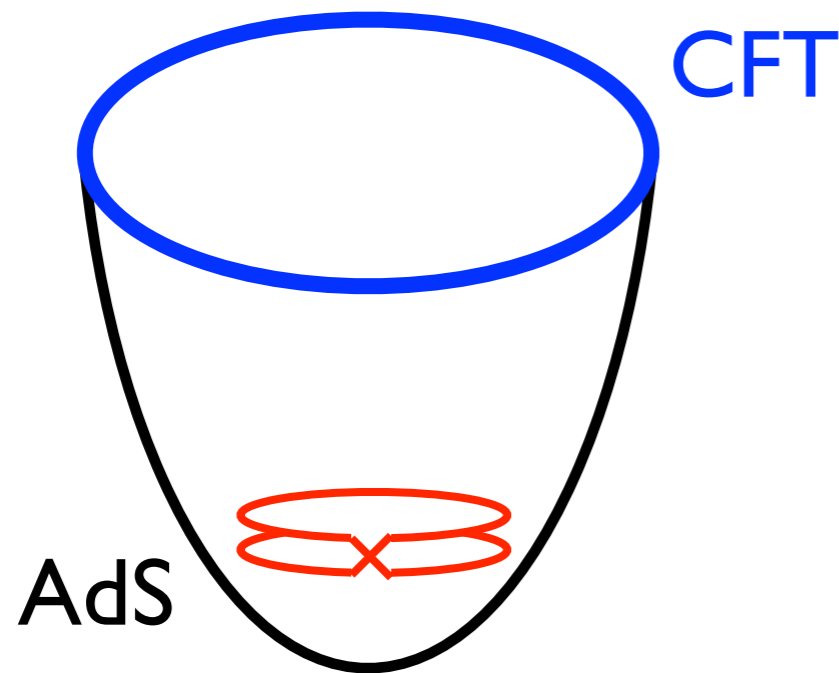
$$\ell_s \sim \ell_{AdS}$$

Tensionless string theory  
on  $AdS_3 \times S^3 \times T^4$



Free symmetric orbifold  
 $(T^4)^N / S_N$  (DID5 CFT)

(Eberhardt, Gaberdiel and Gopakumar, 18...)



$AdS_3 \times S^3 \times T^4$  background  $\leftrightarrow$

1-cycles

A string with winding  $w$   $\leftrightarrow$

a  $w$ -cycle

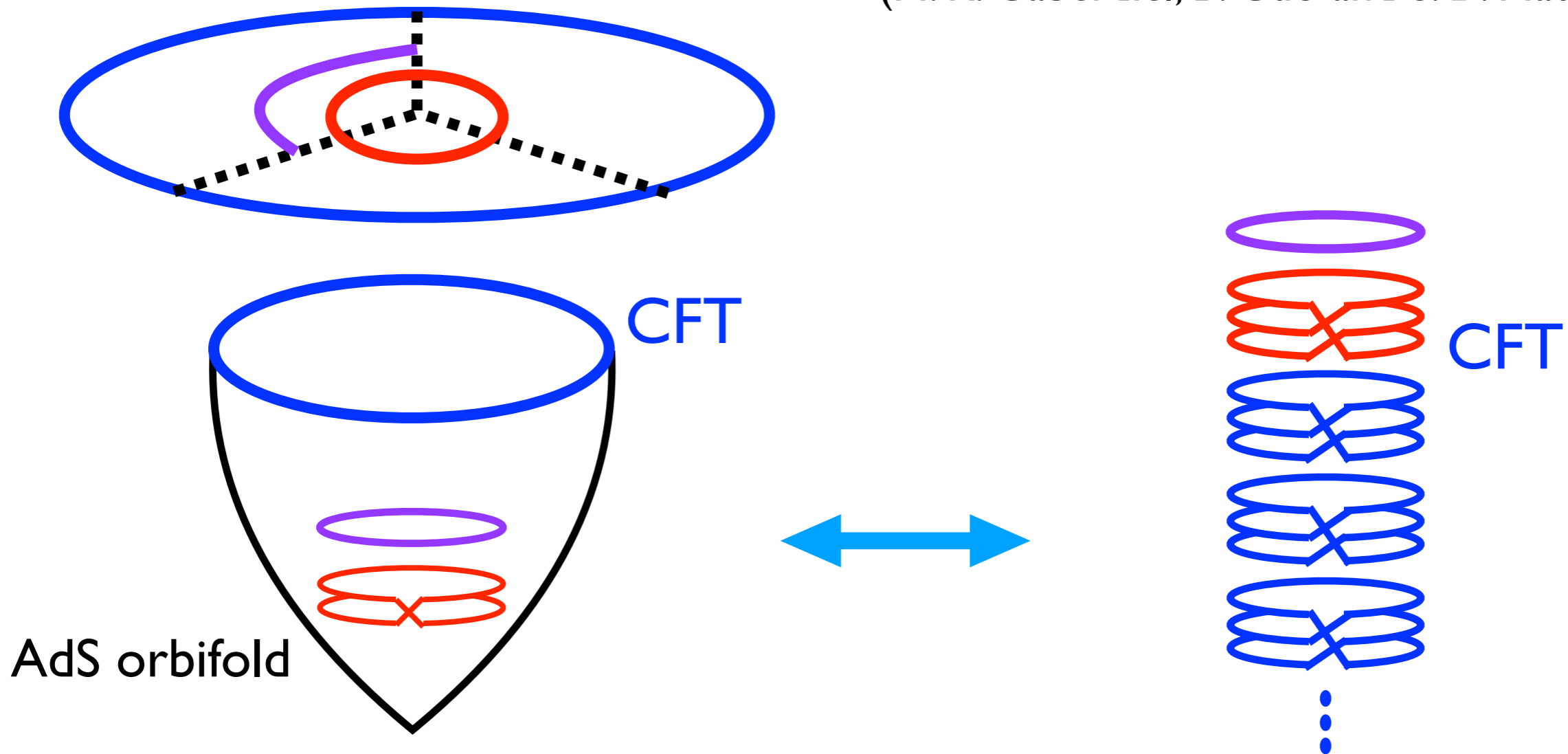
# Questions

Other backgrounds?

Black hole?

# Tensionless strings on $(AdS_3 \times S^3)/\mathbb{Z}_k \times T^4$ : spectrum

(M. R. Gaberdiel, B. Guo and S. D. Mathur, 23)



$(AdS_3 \times S^3)/\mathbb{Z}_k \times T^4$  background  $\leftrightarrow$

k-cycles

A string with winding  $w$  (in  $1/k$ )  $\leftrightarrow$

a  $kw$ -cycle

Condensation of winding  $k$  strings in  $AdS_3 \times S^3 \times T^4$  produces  $(AdS_3 \times S^3)/\mathbb{Z}_k \times T^4$ .

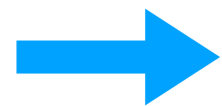
(Eberhardt, 21)

# Correlator (work in progress)

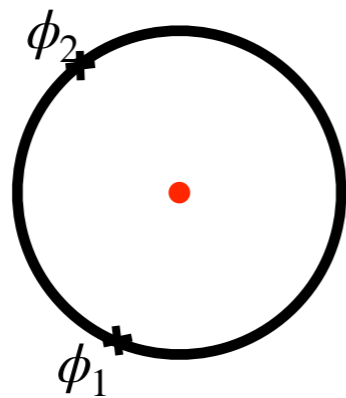
String worldsheet correlators  $\longleftrightarrow$  BCFT correlators.

## Correlator of untwisted strings at genus-0

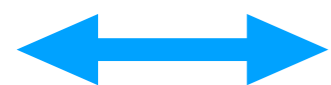
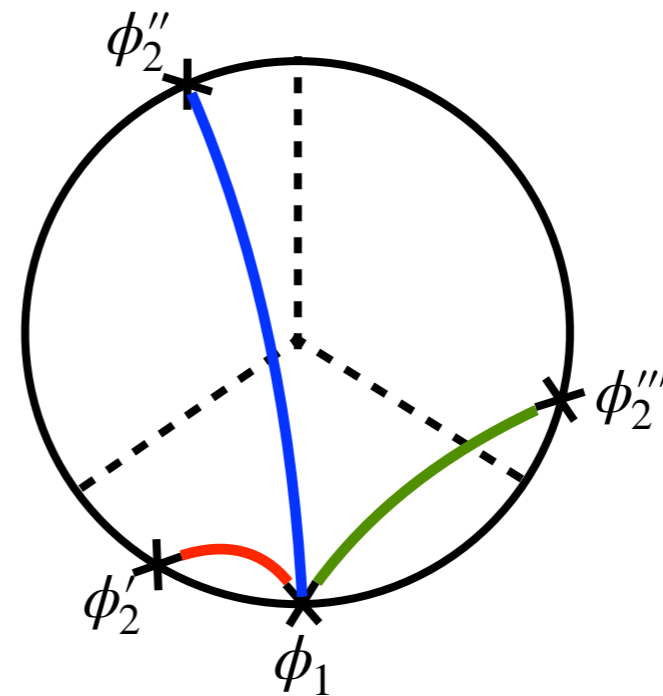
Intermediate strings are untwisted



Semiclassical orbifold geometry: summing over images



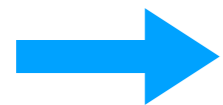
(see also Bufalini, Iguri, Kovensky and Turton, 22)



BCFT correlator at leading order in  $1/N$

## Correlator of untwisted strings at higher genus

Twisted intermediate strings contribute

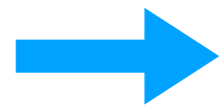


Beyond semiclassical orbifold geometry

From the BCFT, the genus expansion parameter is  $\frac{k}{\sqrt{N}}$ .

$$k \sim \sqrt{N}$$

$$M_{AdS3/\mathbb{Z}_k} = -\frac{N}{2k^2} \sim -O(1)$$



Twisted intermediate strings are important during BH formation.

## Future direction

(Martinec, 23)

$\text{AdS}_3$  orbifolds by Kleinian group (multiple conical defects)



Bag of gold geometry (beyond semiclassical geometry due to twisted strings)

Thank you!