IPhT, CEA-Saclay; CPhT, Ecole Polytechnique

The $T\bar{T}$ deformation, the linear dilaton background and holography

Gong Show

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[based on 2212.09768 with M.Guica, 2306.16454 with S.Chakraborty, M.Guica and work in progress with M.Guica, N.Kovensky]

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$T\bar{T}$ and "single-trace $T\bar{T}$"

$T\bar{T}$: irrelevant deformation of 2d QFTs [Smirnov, Zamolodchikov '16]

$$\mathcal{I}(\mu)_{T\bar{T}} = \mathcal{I} + \int_0^{\mu} d\mu' \int d^2z (T_{zz}T_{\bar{z}\bar{z}} - T_{z\bar{z}}^2)_{\mu'}$$

- UV complete, but non-local
- tractable: finite size spectrum, exact S-matrix and entropy
- Hagedorn behavior at high energies:

$$S(E) = 2\pi\sqrt{\frac{cER}{3} + \frac{c\mu}{6\pi}E^2}$$

- Infinite dimensional ("field-dependent") *Virasoro* $\times$ *Virasoro* symmetry algebra [Guica, Monten '20, Guica, Monten, Tsiares '22]

Single-trace $T\bar{T}$

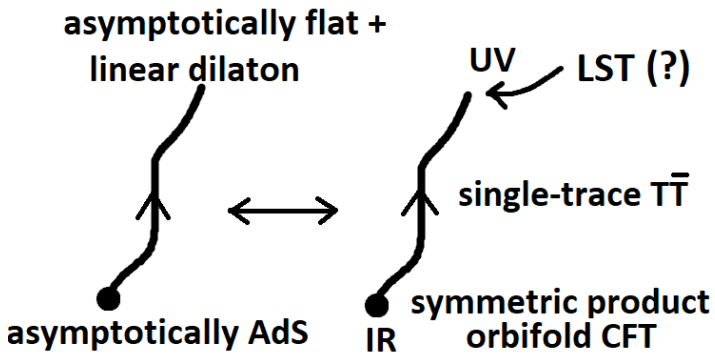
- symmetric product orbifold of $T\bar{T}$ deformed CFTs = $\frac{(T\bar{T}\text{ def }CFT)^2}{S^n}$
- Hagedorn entropy at high energies
- infinite dimensional *Virasoro* $\times$ *Virasoro* symmetry [Chakraborty, S.G., Guica '23]

The asymptotically linear dilaton background (ALD)

- Non-AdS holographic duality from the $g_s \to 0$ decoupling limit of NS5-branes:

string theory in ALD background $\Leftrightarrow$ LST

- Relation between LST compactified to 2d and "single-trace $T\bar{T}$": deformation of AdS_3/CFT_2 into ALD/LST [Giveon, Itzhaki, Kutasov '17]



- Matching of entropies:

BH entropy of black holes in ALD $=$ entropy of single-trace $T\bar{T}$

Holography: single-trace $T\bar{T}$ and ALD

Matching of symmetries [S.G., Guica '22]

The ALD background admits boundary conditions that lead to infinite dimensional "field-dependent" *Virasoro* $\times$ *Virasoro* asymptotic symmetry algebra that matches the symmetries of single-trace $T\bar{T}$.

- There exist irrelevant deformations of the NS5-F1 system that start as $(2,2)$ and preseve supersymmetry and lead to UV complete theories and describe ALD-like backgrounds. [work in progress with M.Guica, N.Kovensky]

Thank you for your attention!