Stringy Horizons

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Strings 2024, Gong Show

To appear with Hong Liu (MIT)

A question

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- For systems **without information loss**, any arbitrarily small time works:

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- For systems **with information loss**, it can be that

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- Algebraically, $\mathcal{T} \neq 0$ means that algebras of operators supported on a **time band** may be inequivalent to the full algebra of the theory.

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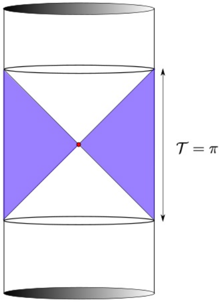

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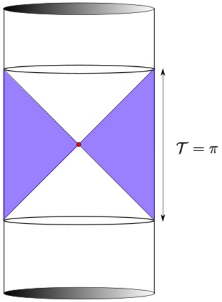

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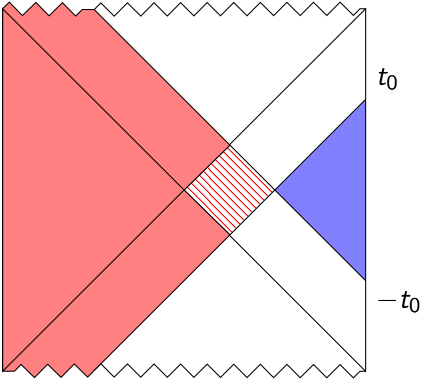

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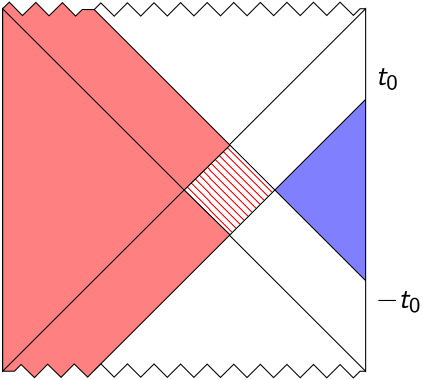

$\mathcal{T} = \infty$: emergence of a **bifurcate horizon**.

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- There is an emergent **stringy horizon** at high temperature even at weak coupling!

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- It can also be used to detect violations of the **equivalence principle** in the stringy regime.
- When applied to **modular time** instead of boundary time, $\mathcal{T}$ can also be used to diagnose the presence of a **stringy QES** rather than a stringy horizon.

The jump to $\mathcal{T} \neq 0$ at large N is the basic mechanism allowing for the emergence of a radial direction and horizons in AdS/CFT, even in the stringy regime.

Thank you!