CFT entanglement and bulk connectivity: Comment on the TFD

\[ |TFD \rangle = \sum e^{-E/2T} |E \rangle |E \rangle \]
\[ |O \rangle_{\text{Mink(AdS)}} = \sum e^{-\frac{E}{2T}} |E \rangle_{\text{Rindler}, R} |E \rangle_{\text{Rindler}, R} \]

TFD has 1) trans-CFT entanglement &
2) trans-horizon entanglement in the bulk
But these are not the same entanglements! (Different E’s!)

\[ E_{\text{Rindler}, R} = \int_{\Sigma_R} \sqrt{h} \ \text{Tab na Kb} \]
\[ E_{\text{CFT}, R} = E_{\text{ADM}, R} = \text{bndy term @ B} \]

To leading non-trivial order in \( \ell_{\text{Planck}} \)
\[ \Delta = E_{\text{CFT}} - E_{\text{Rindler}, R} = \text{bndy term @ H} \]
which generates kinks in \( \Sigma_R \) relative to \( \Sigma_L \).
Comments:

- By symmetry, $\Delta$ lives equally in both CFTs.

- Acting on $|\text{TFD}\rangle$ with $\sum_i e^{-iH ti}$ can produce $|E_L\rangle|E_R\rangle$ but does not obviously disentangle bulk or produce a "firewall." Merely produces a superposition of wormholes.

- Acting on $|\text{TFD}\rangle$ with $b, b^\dagger$ does not obviously disentangle the CFTs.

- Ryu-Takayangi certainly implies some correlation between bulk vacuum entanglement (measured by area) and CFT entanglement. But this does not imply physical equivalence.