

Title: Focus Lecture

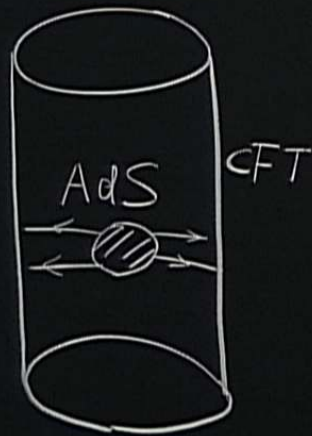
Date: Jul 25, 2016 05:00 PM

URL: <http://pirsa.org/16070038>

Abstract:

A Primer on Bulk Reconstruction

(Part 1)



| AdS_{d+1} | CFT_d |
|---------------|--------------------|
| Isometry | Conformal $O(d,2)$ |
| Gauge sym | Global sym |
| BH states | thermal states |
| bulk fields | single-trace ops |
| boundary cond | sources |

• emergent gravity

$$CFT \sim SU(N)$$

$$\Phi \in \text{adj}$$

$$\text{Tr}(\Phi^\dagger \Phi)$$

$$[\text{Tr}(\Phi^\dagger \Phi)]^2$$

Correlators:

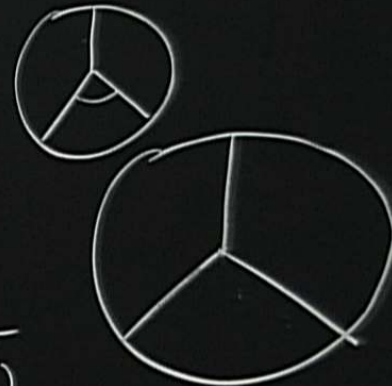
1) Differentiate dictionary (GKPW)

$$Z_{\text{CFT}}[\phi_0] = Z_{\text{grav}}[\phi_0]$$

$$\int \mathcal{D}\Phi e^{-S + \int_x \phi_0 \mathcal{O}}$$

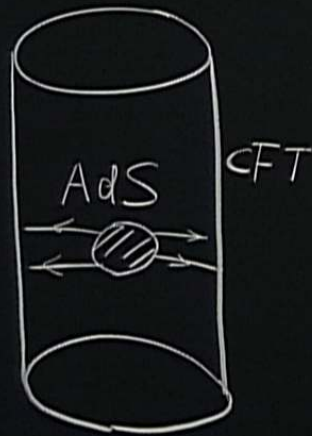
$$\langle \mathcal{O}(x_1) \dots \mathcal{O}(x_n) \rangle = \frac{\delta^n Z_{\text{grav}}}{\delta \phi_0(x_1) \dots \delta \phi_0(x_n)}$$

2) Extrapolate dictionary (BDHM)



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emergent gravity

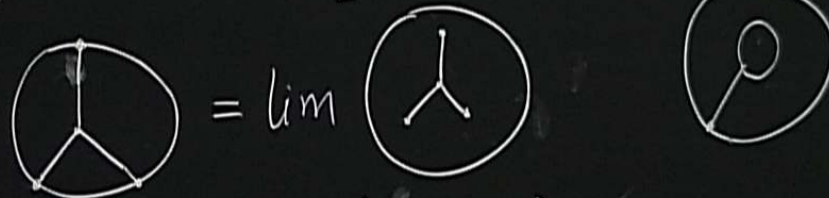
$$CFT \sim SU(N)$$

$$\Phi \in \text{adj}$$

$$\text{Tr}(\Phi^\dagger \Phi)$$

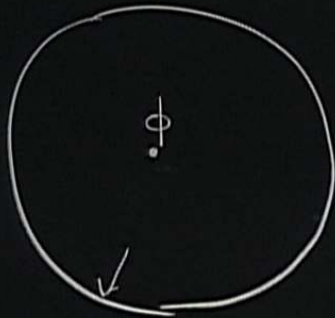
$$[\text{Tr}(\Phi^\dagger \Phi)]^2$$

$$\langle \mathcal{O}(x_1) \dots \mathcal{O}(x_n) \rangle = \lim_{z \rightarrow 0} z^{-n\Delta} \langle \phi(x_1, z) \dots \phi(x_n, z) \rangle$$



$$\mathcal{O}(x) = \lim_{z \rightarrow 0} z^{-\Delta} \phi(x, z)$$

$$\phi(x, z) = ? \text{ from CFT}$$



HKLL

hep-th/0506118

0606141

$\lambda\phi^2$

$$(\nabla^2 - m^2)\phi(x, z) = 0, \quad \lim_{z \rightarrow 0} z^{-\Delta} \phi(x, z) = \mathcal{O}(x)$$

$$\phi(x, z) = \int dx' K(x, z; x') \mathcal{O}(x')$$

K

K Witten

Evolves \mathcal{O} to AdS
 $z \rightarrow 0: \sim z^{\Delta} \delta(x-x')$

Evolves ϕ_0 to AdS
 $\sim z^{d-\Delta} \delta(x-x')$



$\exists K$

$\text{support}(K) = \text{band}$

$\exists K, \text{support}(K) = D[A]$
 $\forall \phi \in \text{WR}[A]$

AdS-Rindler

$D[A] = \text{WR}[A] \cap \partial \text{AdS}$

$\langle [\phi_x, \phi_{x'}] 0 \cdot 0 \rangle = 0$
 $x - x' = \text{spacelike}$



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