

Warming up...

- We skipped the problem in lecture 13 about the quasinormal modes so can someone who knows how it works help us?

Lec 15: Correlation Functions in AdS/CFT

- Where do 15.16 and 15.17 come from?
- Is there a definite value of mass where the operators on the boundary start being dual to black hole states instead of fields?
- Can we see properties like 15,18 just from CFT if we consider the known conditions for a CFT to have a gravity dual? If not, what kind of properties can we know?
- How can we use the duality if the bulk is strongly coupled and the boundary is weakly coupled?
- Can we deduce from the statement

$$Z_{cft} = Z_{gravity},$$

the fact that:

$$\langle O(x)O(y)..O(..) \rangle_{bdy} = \lim_{r \rightarrow \infty} r^{n\Delta} \langle \Phi(x,r)\Phi(y,r).. \Phi(..) \rangle_{bulk}$$

Witten's paper

- (pg.2) "*Irrelevant, marginal, and relevant perturbations of the field theory correspond to massive, massless, and tachyonic modes in supergravity.*" Is there an intuitive way to see why irrelevant \rightarrow massive, relevant \rightarrow tachyonic?
- what is a conformal structure?
- Can we think for a moment about his argument on page 6 that scalar fields on the boundary can be uniquely extended to the bulk?
- On page 19: what is the relevance of the fact that the finite piece of the conformal anomaly is local?
- Can we explain the statements below equation 2.36? Why do we choose the transformation of ϕ_0 to cancel that of f ?
- In the second paragraph of page 7, I feel like he is saying something important but I don't get it totally so can anyone make it clearer?

- I don't understand what he is doing when he is talking about the boundary behavior of massive scalar fields.
- Why do massless p-forms in the bulk couple to operators of dimension d-p on the boundary?
- Comment about the large N limit of NON-conformal SU(N) gauge theories and how we flow to conformal ones. How is the corresponding dual picture (in SUGRA and strings) under this flow?
- Expand on (pg.4) *"This realization of holography(from Maldacena) is somewhat different from what is obtained in the matrix model of M-theory (BFSS model) [34], since for instance it is covariant (under SO(2, d)). But otherwise the two are strikingly similar. In both approaches, M-theory or string theory on a certain background is described in terms of a field theory with maximal supersymmetry."*
- What happens if we include self-Interactions to the massless/massive cases
- Anomalies in CFT, what if CFT path integral is non convergent (see them again!)