Gauge/Gravity Duality

Exam - LMU Munich

October 5, 2018

1) What is the origin of the conformal symmetry of $\mathcal{N} = 4$ SYM (or any other CFT)?

2) Give one motivation for holography in the context of string theory.

3) Give one motivation for holography without involving string theory.

4) AdS/CFT relates theories defined in spaces of different number of dimensions. How can these spaces connect to each other?

5) Measurements have shown that the cosmological constant Λ in our universe is zero, or almost zero. However, AdS has a negative Λ. Why doesn't this bother us?

6) Give one example of something that can be computed exactly on both sides of the AdS/CFT correspondence.
(You don't have to explain the computation, just define it on the CFT and explain what is the corresponding quantity or function in AdS)

7) Give one motivation for why QCD could have a gravity dual.

8) Comment on one significant difference between black holes in AdS spacetime and black holes in flat spacetime.