Questions – Week 10: Eternal Black Holes and Entanglement

March 21, 2016

1. In the doubling of the fields at the beginning of Sec. 17.1, what does it mean for the "two fields [to] live in different spacetimes x_1 and x_2"? Does this mean two disconnected spacetimes whose union is the full spacetime?

2. To what does the Hamiltonian $H_1 + H_2$ correspond in the bulk?

3. How do we build the bottom half of the eternal black hole from the path integral?

4. Maldacena says that the eternal black hole is time dependent so why is the TFD time independent?

5. About ER=EPR, "the left-right correlation functions can be approximated by geodesics that pass through the black hole interior", but why only for very massive fields or high energies? The correlation goes to 0 for light fields or low energies? Why?

6. Regarding the comments at the beginning of section 17.4. In what what does the information paradox rely on the black hole forming from collapse? And why does this only happen for small black holes?

7. How does the argument below equation 17.26 *not* serve as a solution to the information paradox? What does it mean to "recover" the lost information in quantum gravity?

8. General question that came to my mind while reading: what is the gravity dual of the state that is a linear combination of for example the vacuum and the TFD? How do we compute stuff in the bulk for that state?