Higher derivative gravity and holography

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Stellingen behorende bij het proefschrift

Higher Derivative Gravity and Holography

Luca Basanisi, 3 November 2017

- Supersymmetry and Entanglement Entropy can be used to probe a gravity model by revealing new behaviors and limitations.

[Chapter 1]

- Studying the gravitational interaction calls for simplifications in order to deal with complicated equations. Adding higher derivatives, as in the case of New Massive Gravity, gives the possibility of studying a mathematically simple model while maintaining a rich dynamics.

[Chapter 2]

- In order to construct a supersymmetric theory of gravity, it is convenient to first construct a theory with a larger symmetry, namely a superconformal theory, and then gauge fix the extra symmetries to obtain the desired model.

[Chapter 3]

- There are two different ways of extending New Massive Gravity with $\mathcal{N} = 2$ supersymmetries. The two models differ in the set of symmetries that they preserve and only one of them admits a ghost-free spectrum of energy fluctuations around an AdS spacetime.

[Chapter 3]

- The presence of higher derivatives in a supergravity theory allows a larger set of solutions that preserve at least one supersymmetry. One can classify such solutions according to the nature of their killing vectors and supersymmetry facilitates this classification.

[Chapter 4]

- A study of holographic entanglement entropy reveals that the presence of higher derivatives in the holographic model calls for a modification of the prescription of how the entanglement entropy is computed. It also implies a deformation in the mathematical properties of the entangling surface used in the holographic description.

[Chapter 5]

- The time spent in dealing with bureaucracy and in organizing formal ceremonies is in great disproportion with the time the academic institutions spend in caring about the mental health of the people that are part of them.