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Aspects of three dimensional gravity

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Aspects of Three Dimensional Gravity

Marija Kovačević, 22 December 2017

1. General Relativity is a complicated non-linear theory and modifying it is not an easy task. Any modified theory would have to provide solutions for the issues that arise at both energy scales: the infrared and the ultraviolet.
2. There are two ways to introduce mass to the graviton. One way is through an explicit mass term. Another way is by introducing higher derivative terms in the action.
3. A special property of three dimensions is that the Einstein-Hilbert action describes no local degrees of freedom. Adding 4th-order derivative terms to the Einstein-Hilbert action, the resulting theory will describe only a massive spin-2 particle and a scalar particle only.
4. The New Massive Gravity action for even spins is ghosts-free.
5. Although, there has been no experimental evidence that fundamental higher-spin particles exist in nature, studying the higher-spins theories leads to a better understanding of the theory of gravity.
6. Low-derivative version of linearized Supersymmetric New Massive Gravity requires the introduction of so-called auxiliary fields.
7. A non-trivial coupling between a scalar and the current multiplet of the linearized Supersymmetric New Massive Gravity theory gives rise to a discontinuity in the massless limit.
8. One can switch between different non-relativistic backgrounds either by partially gauging or gauge-fixing some of the non-relativistic symmetries.
9. PhD research takes away all your abilities to see the beauty of physics. The question is: where does the beauty of physics come from?
10. There is nothing wrong about being a woman. There is something wrong about all of them being men.