Poster Session #C
Gravity theories

C20

Losing the trace to find dynamical Newton or Planck constants

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I will discuss e-Print: 2011.07055 where we showed that promoting the trace part of the Einstein equations to a trivial identity results in the Newton constant being an integration constant. Thus, in this formulation the Newton constant is a global dynamical degree of freedom. As usual this global degree of freedom is a subject to quantization and quantum fluctuations. This is similar to what happens to the cosmological constant in the unimodular gravity where the trace part of the Einstein equations is lost in a different way. In this e-print above, we introduced a constrained variational formulation of these modified Einstein equations. Then, drawing on analogies with the Henneaux—Teitelboim action for unimodular gravity, we constructed different general-covariant actions resulting in these dynamics. It turned out that, the inverse of dynamical Newton constant is canonically conjugated to the Ricci scalar integrated over spacetime. Surprisingly, instead of the dynamical Newton constant one can formulate an equivalent theory with a dynamical Planck constant. Finally, I will speculate that an axion-like field can play a role of the Newton constant or the Planck constant.