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Hiding fifth forces with radiative symmetry breaking.

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Scalar-tensor theories of gravity are a class of modified gravity theories that offer an alternative to Einstein's general theory of relativity. The main aim of these theories is to address long-standing challenges of modern physics, such as the nature of dark matter and the origin of the accelerated expansion of the Universe. The latter of these problems can be addressed by the so-called fifth forces that appear in the scalar-tensor theories, though they are heavily constrained by the local tests of gravity conducted within the Solar System. These constraints can be however evaded by the introduction of the screening mechanisms, that suppress such forces in regions of high ambient density.

The screening mechanism is usually introduced to the theory at a level of classical action and can suffer radiative instability, which can be cured by fine-tuning of the model's parameters. An alternative approach was proposed in [1]. The authors showed that the one-loop Coleman-Weinberg spontaneous symmetry breaking can result in the screening mechanism analogous to the symmetron model. This poster presents an ongoing work on the extension of the calculation presented in [1], in which the modification due to second-order gravitational operators is considered.

[1] Burrage, C., Copeland, E.J. and Millington, P. (2016). Radiative Screening of Fifth Forces. Physical Review Letters, 117(21)

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