

Massive Gravity in the Worldline Formalism

Tuesday, 24 September 2024 12:35 (25 minutes)

Despite the considerable success of General Relativity, the search for alternatives has been an ongoing challenge since its formulation to address some of the most crucial open questions in physics, such as the cosmological constant problem and the origin of the late-time acceleration of the universe. An intriguing modification suggests that gravity could be propagated by a massive spin 2 particle: a massive graviton. In this talk, I will present a novel discussion from a worldline perspective, employing the first-quantized models known as $O(N)$ spinning particles. Specifically, our focus will be on the massive $N=4$ spinning particle. First, I will show that BRST quantization allows for the correct reproduction of the Fierz-Pauli theory on Minkowski. The extension to curved spacetime is trickier, and nilpotency of the BRST charge seems to require a Ricci-flat spacetime as the only consistent background. Once the BRST system is realized, it is possible to construct the worldline path integral on the circle, providing a worldline representation of the one-loop effective action of Linearized Massive Gravity. If time permits, I will discuss the calculation of the Seeley-DeWitt coefficients, including the $a_3(D)$ coefficient previously not known in the literature.

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