Renormalization in curved space-times via a mode-decomposition of the Feynman Green Function

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In quantum field theory in curved space-time, an important physical quantity is the renormalized expectation value of the stress-energy tensor (RSET), $\langle \hat{T}_{\mu\nu} \rangle_{\rm ren}$, which appears as the source term in the semiclassical Einstein field equation. The renormalization method that is usually implemented in the literature applies to static space-times. However, it does not readily generalize to some other types of space-time, including the important case of Kerr space-time. In this talk, we present a method for renormalization via a mode-decomposition of the Feynman Green Function[1], which may be used for more general space-times, such as Kerr space-time. We also show the application of the aforementioned method for the calculation of the RSET in a specific space-time.

References

[1] G. Freitas and M. Casals, *A novel method for renormalization in quantum-field theory in curved spacetime*, Int. J. Mod. Phys. D **27**, No. 11, 1843001 (2018).

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