
# Infrared divergences for quantum fields in cosmological spacetimes

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Our universe is believed to have experienced an inflationary period in its early stages of development. It is therefore of interest to understand the behaviour of the graviton two point function in an inflationary spacetime. We consider a background Friedman-Lemaitre-Robertson-Walker (FLRW) spacetime, which is a (slow roll) inflationary spacetime. The graviton two point function is known to be infrared divergent in such a spacetime. It has been previously found, in de Sitter spacetime, that a large coordinate gauge transformation can be used to remove the infrared divergence, and this suggests that the divergence should not lead to local physical effects. The next natural step appeared to be to see if this type of transformation could be used effectively in a FLRW spacetime. We found that this was indeed the case, and removed the leading order divergence of the graviton two point function. The correspondence between the gauge invariant part of the graviton two point function and the linearized Weyl tensor correlator gives a bound on the extent to which the divergence can be removed. This bound suggests that our transformation removes all unphysical infrared divergence, without affecting the physical behaviour of the two point function.