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Weyl Invariance and Higher Spin Gauge Theory

Abstract

We construct all possible Weyl invariant actions in $d = 4$ for linearized spin three field in a general gravitational background. The first action is obtained as the square of the generalized Weyl tensor for a spin three gauge field in nonlinear gravitational background. It is, however, not invariant under spin three gauge transformations. We then construct two other nontrivial Weyl but not gauge invariant actions which are linear in the Weyl tensor of the background geometry. We then discuss existence and uniqueness of a possible linear combination of these three actions which is gauge invariant.