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## Adiabatic regularization for massive and massless spin-1 fields

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The adiabatic regularization method is likely the most direct and intuitive subtraction scheme for FLRW cosmologies. The method requires one to start with a nonvanishing mass, but massless theories can be studied by taking the massless limit at the end of the calculations. In fact, the conformal anomaly for scalar fields was first derived with the adiabatic method by taking the massless limit. For spin-1, however, this limit changes the number of degrees of freedom, so it cannot be performed directly.

In this work, we show a direct approach that begins with the canonical quantization of a massive Proca field in FLRW. We give the details of the construction and show that, in the massless limit, the renormalized stress-energy tensor of the Proca field is closely related to that of a minimally coupled scalar field.

Bibliography: [DOI 10.1103/PhysRevD.108.125001]

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