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Adiabatic renormalization with an IR cut-off

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We introduce a new approach to renormalize physical quantities in curved space-time by adiabatic subtraction. We use a comoving infrared cut-off in defining the adiabatic counterpart of the physical quantity under consideration. We show how this infrared cut-off should be used to obtain a completely well-defined renormalization scheme and how it is fundamental to avoid unphysical divergences that can be generated by a pathological behavior of the adiabatic subtraction extended to the infrared domain. The infrared cut-off appears as a new degree of freedom introduced in the theory and its actual value has to be consistently fixed by a physical prescription. As an example, we show how such degree of freedom can be set to obtain the correct value of the conformal anomaly in the symptomatic case of an inflationary model with gauge fields coupled to a pseudo-scalar inflaton.

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