
On renormalization group invariance of resummed effective potential

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Abstract

Effective potential is a standard tool to analyze thermal phase transitions. It is known that perturbative expansion at zero temperature breaks down at high temperature due to infrared divergence. To cure this problem, thermal resummation is indispensable. However, the renormalization group (RG) invariance that is present at zero temperature is lost by such a thermal resummation.

In this talk, I will begin by showing the RG non-invariance of resummed effective potential in ϕ^4 theory up to 2-loop order, and then propose a scheme in which RG invariance holds order by order in resummed perturbation theory. Our numerical analysis shows that renormalization scale dependence in our scheme gets milder at 1-loop level while not so much at 2-loop level owing to simplicity of the model. Finally, future direction will also be mentioned.

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