Contribution ID: **2041**   Type: **Poster**

Renormalization group improvement of effective potential for an arbitrary scalar field theory with massive term.

Monday 27 October 2025 18:30 (20 minutes)

We derive a system of generalized renormalization-group equations for the effective potential of an arbitrary scalar field theory with mass based on the Bogoliubov-Parasiuk theorem on locality of counterterms. These equations sum up the leading logarithmically divergent contributions and represent a system of nonlinear partial differential equations of the second order. We show that in some cases this system can be reduced to a system of ordinary differential equations and solved using numerical methods. In particular, for the renormalizable quartic potential, the solution can be obtained analytically recovering known well-known solutions.

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Session Classification: Poster session & Welcome drinks

Track Classification: Theoretical Physics