

Electric field fluctuations in a self interacting scalar theory

Tuesday, 2 December 2025 18:05 (0:10)

Content

We consider the effects of a noisy weak electric field over the two-point and four-point correlation functions of a self interacting complex scalar field theory, as an approach to the extreme physical conditions reproduced in scenarios such as relativistic heavy-ion collisions. The bosonic propagator in presence of a constant electric field is derived using the Schwinger-Fock proper time method. To consider the fluctuations of the electric field, the statistical average of the generating functional of the theory is derived using the replica trick. The fluctuations are modeled as classical white noise following a gaussian probability distribution, which depends on the correlation length of the fluctuations Δ_E . This parameter emerges as an effective coupling between scalar currents. The self energy and the vertex correction at one loop are found in order to study the renormalization group equations of the theory.

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Session Classification : Poster session