

Finite-temperature effective potentials in models with extended Higgs sector and critical temperatures

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In this report authors discuss features of some topological methods for baryogenesis and phase transition analysis, including models with an extended scalar sectors at finite temperatures. The first and second differential forms are implemented for the effective potential. The classic picture of baryogenesis in grand unification theories has changed significantly with the standard model development and the phase diagram of electroweak interactions specification with experimental data on Higgs boson physics. Currently the minimal extension of the scalar sector has a less likely to be realized, therefore, an important role is played by researching of the non-minimal extensions. In previous papers authors considered a general scalar Higgs sector, including the violation of CP-invariance and temperature corrections for control parameters, conditions for the effective potential that lead to the phase transition of the strong first order required for the generation of the observed baryon asymmetry. Additional chiral field plays here the role of the phase transition stabilizing foam. The feature of the upcoming research is that the violations of symmetries and temperature contributions of the self-potential affect the dark sector is supersymmetric models, which could have consequences for cosmology. That is possibility to significantly change the mass of the cold dark matter particles and intensity of their interaction with other particles and the ability to participate in electroweak decays, including the decay of Higgs bosons. Results for Higgs fields in the case of CP-violating and temperature corrections are used for dark sector physical parameters calculations. Also, the annihilation of neutralinos in the framework of quantum field theory in conjunction with Feynman diagram approach was taking into account with one-loop corrections. Temperature one-loop effective potential for NMSSM is reconstructed. Physical masses conditions is determined and the one-loop corrections to the dimensionless parameters of the effective potential are evaluated in the framework of NMSSM. The general case is investigated for calculations of one-loop diagrams with different masses in finite temperature field theory, some representations of infinite series and generalized function of Hurwitz are proposed. Surfaces of the stationary points in space background fields and matrix stability are reconstructed, including difference from SM physical basis in the alignment limit. Scenarios of stationary points and critical temperatures were determined, extreme curves and surfaces based on the definition of Grobner bases are also considered.

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