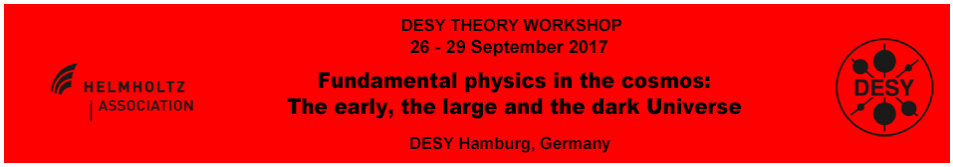

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Effects of equation of state in the Standard Model on the primordial gravitational wave spectrum

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The existence of relic gravitational waves (GWs) is one of the most important predictions of inflationary models, and the knowledge about their detailed spectrum will become indispensable in future direct detection experiments. In this work, we investigate thermodynamic properties of high temperature plasma composed of elementary particles of the Standard Model, and identify how such properties affect the spectrum of primordial GWs. The evolution of the equation of state of radiations with interacting particles is estimated based on the latest results of perturbative and non-perturbative calculations, and the effective degrees of freedom for the energy density and the entropy density as a function of temperature are obtained. After obtaining the effective degrees of freedom, we numerically compute the spectrum of GWs by taking account of the evolution of the Standard Model equation of state. It is shown that the spectrum of GWs at high frequencies is corrected due to the effect of particle interactions, and that such corrections are relevant to future high sensitivity experiments.

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