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A formulation to study formation of Bose-Einstein condensation in cosmology at the level of particle physics processes

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This talk will be mainly based on the paper; R. Erdem and K. Gultekin. JCAP 10 (2019) 061. By considering dynamics of a scalar Bose-Einstein condensation at microscopic level, we study the initial phase of formation of condensation in cosmology. To this end, first we introduce an effective Minkowski space formulation that enables considering only the effect of particle physics processes, excluding the effect of gravitational particle production and enabling to see cosmological evolution in an easier way. Then, by using this formulation we study a model with trilinear coupling ² that induces the processes $\chi\chi\phi$. After considering the phase evolution of the produced ϕ particles, we find that they evolve towards formation of a Bose-Einstein condensate provided some conditions are satisfied. In principle, the effective Minkowski space formulation introduced in this study can be applied to particle physics processes in any spacetime that is sufficiently smooth.

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