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Unifying baryogenesis with dark matter production

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According to several observational evidences, the Hot Big Bang Model is the best framework in which to explain the origin and the evolution of the universe. By the way, it is still not the definitive model. Among its weaknesses, we have to count the lack of a satisfying explanation of how baryons and dark matter formed. In this article we attempt to describe these phenomena through a new interpretation of the model itself. We propose baryogenesis can occur as the environment field, associated with universe's expansion, couples to effective quark and lepton fields. Consequently, we propose how to unify the baryogenesis with dark matter production during reheating and evaluate the corresponding densities. Soon after dark matter's born, we justify how to cancel out vacuum energy degrees of freedom through a mechanism that counterbalance vacuum energy with dark matter pressures. We thus predict both dark matter and baryon densities, showing which dark matter constituent is expected to guarantee the mechanism above described. Here, for simplicity, we do not consider strong interactions, so a generalization of this work will be necessary in order to obtain a complete and realistic physical model.

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