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Dark matter production and baryogenesis from the Q-ball decay

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We consider the Q-ball decay and investigate the scenario that the amount of the baryons and the gravitino dark matter is at the same time naturally explained by the decay of the Q balls in the gauge-mediated SUSY breaking. We show the decay rates into baryons, NLSPs, and gravitinos, and estimate their branching ratios based on the consideration of Pauli blocking. Although the NLSPs are produced by the Q-ball decay, the efficient annihilations of NLSPs occur afterward so that their abundance does not spoil the successful BBN and they only produce negligible contribution to the gravitino dark matter density from their decay. In this way, we find that the scenario with the direct production of the gravitino dark matter from the Q-ball decay works naturally.

Primary author: Dr KASUYA, Shinta (Kanagawa University)

Presenter: Dr KASUYA, Shinta (Kanagawa University)

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