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Dark matter and baryon-number generation in quintessential inflation via hierarchical right-handed neutrinos

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Incorporating three generations of right-handed Majorana neutrinos to quintessential inflation, we construct a model which simultaneously explains inflation, dark energy, dark matter and baryogenesis. These right-handed neutrinos have hierarchical masses $M_3 \sim 10^{13}$GeV, $M_2 \sim 10^{11}$GeV, $M_1 \sim 10$keV and are produced by gravitational particle production in the kination regime after inflation. The heaviest, the intermediate, and the lightest account for reheating, CP violation of leptogenesis, and dark matter, respectively. We consider various constraints from particle experiments and cosmological observations. If we adopt the Randall-Sundrum brane-world scenario, these constraints on parameters are satisfied without fine-tuning.

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