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The minimal GUT with inflation and dark matter unification

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Giving up the solutions to the fine-tuning problems, we propose the non-supersymmetric flipped $SU(5) \times U(1)_X$ model based on the minimal particle content principle. To achieve gauge coupling unification, we introduce one pair of vector-like fermions, which form complete $SU(5) \times U(1)_X$ representation.

Proton lifetime is around 5×10^{35} years, neutrino masses and mixing can be explained via seesaw mechanism, baryon asymmetry can be generated via leptogenesis, and vacuum stability problem can be solved as well. In particular, we propose that inflaton and dark matter particle can be unified to a real scalar field with Z_2 symmetry, which is not an axion and does not have the non-minimal coupling to gravity. Such kind of scenarios can be applied to the

generic scalar dark matter models. Also, as one of realistic examples in our model, we find that the vector-like particle corrections to the SM prediction of the mixing M_{12} for B_s^0 can be about 6.6%, while their corrections to the K^0 and B_d^0 are negligible.

Summary

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