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Vacuum Stability and Inflationary Dynamics in Gauged $U(1)_{(B-L)}$ Model

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$U(1)_{B-L}$ model is the minimal gauge extended Standard Model(SM) where an extra $U(1)$ gauge group is augmented to the SM. This model is of great importance since the extra Abelian symmetry groups can originate from different high scale Grand Unified Theories, like $SO(10)$, $E(6)$ etc.

I will briefly discuss three key aspects of the model. First encounters the boundedness of the scalar potential and how vacuum stability constrains the parameters of this model. Another important aspect is that the model can provide a viable dark matter candidate provided the DM stability is ensured by an additional \mathbb{Z}_2 symmetry. Finally I will discuss the interesting possibility that if the $B - L$ symmetry is broken at very high scale, the heavy scalar can act as an inflaton. I will discuss how recent observations of BICEP and PLANCK data can constrain parameters of this model.

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