

After presenting the no-scale Higgs inflation models à la flipped SU(5) and Pati-Salam, we investigate the reheating process in these GUT models. Since reheating happens after inflation, and launches the Universe into the hot Big-Bang era, it should be treated as a part of the complete inflation theory. However, unlike the inflationary epoch when the physics is almost determined by the inflationary potential alone, the reheating period is quite complicated and involves detailed dynamical properties of the model. While a detailed description of the reheating process is an interesting topic in itself, our analysis here is motivated by the imprint of the post-inflationary evolution of the inflaton on primordial fluctuations through the number of e -folds, which are sensitive to the mechanism for reheating. The on-going measurements of CMB observables with increasing precision are beginning to impose nontrivial constraints on the reheating scenario within a given model of inflation [17]. One special feature of the GUT models we study is that the inflaton potential changes dramatically in the post-inflationary era, due to GUT symmetry breaking. As a result, the original quadratic or exponentially flat inflationary potential changes into a quartic monomial after the end of inflation, making the Universe effectively radiation-dominated. The moment of this effective radiation domination can be quite well determined in our models, and is well before the onset of the reheating process. In consequence, the number of e -folds and the spectral index in our models are essentially independent of the reheating temperature, and can be determined relatively precisely.

This paper is organized as follows. In Section , we construct models of Higgs inflation in no-scale SUSY GUTs with the flipped SU(5) and Pati-Salam gauge groups, respectively. In Section , we first analyze the predictions from our no-scale GUT Higgs inflation models for the scalar tilt n_s and the tensor-to-scalar ratio r . We then study the reheating process after Higgs inflation in these models, and compute their prediction for the numbers of e -folds during inflation. We further discuss the issue of gravitino production after inflation in these models. Finally, we draw our conclusions in Section .

2 Higgs Inflation in No-Scale Supersymmetric GUTs

In this Section, generalizing our previous no-scale SU(5) GUT model construction [6], we construct new models of Higgs inflation in no-scale GUTs with other GUT groups. In particular, we choose as two concrete realizations the flipped SU(5) GUT [14, 15] and the Pati-Salam $SU(4) \otimes SU(2)_L \otimes SU(2)_R$ GUT [16]. These GUT groups are both major alternatives to the minimal SU(5) GUT, and can readily be embedded into the SO(10) GUT or