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## Tensor to scalar ratio and large scale power suppression from pre-slow roll initial conditions

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We study the corrections to the power spectra of curvature and tensor perturbations and the tensor-to-scalar ratio  $r$  in single field slow roll inflation with standard kinetic term due to initial conditions imprinted by a fast-roll stage prior to slow roll. For a wide range of initial inflaton kinetic energy, this stage lasts only a few e-folds and merges smoothly with slow-roll thereby leading to non-Bunch-Davies initial conditions for modes that exit the Hubble radius during slow roll. We describe a program that yields the dynamics in the fast-roll stage while matching to the slow roll stage in a manner that is independent of the inflationary potentials. Corrections to the power spectra are encoded in a transfer function for initial conditions  $\mathcal{T}_\alpha(k)$ ,  $\mathcal{P}_\alpha(k) = P_\alpha^{BD}(k)\mathcal{T}_\alpha(k)$ , implying a modification of the “consistency condition” for the tensor to scalar ratio at a pivot scale  $k_0$ :  $r(k_0) = -8n_T(k_0) [\mathcal{T}_T(k_0)/\mathcal{T}_R(k_0)]$ . We obtain  $\mathcal{T}_\alpha(k)$  to leading order in a Born approximation valid for modes of observational relevance today. A fit yields  $\mathcal{T}_\alpha(k) = 1 + A_\alpha k^{-p} \cos[2\pi\omega k/H_{sr} + \varphi_\alpha]$ , with 1.5

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*lessim2*,  $\omega \simeq 1$  and  $H_{sr}$  the Hubble scale during slow roll inflation, where curvature and tensor perturbations feature the  $p, \omega$  for a wide range of initial conditions. These corrections lead to both a suppression of the quadrupole and oscillatory features in both  $P_R(k)$  and  $r(k_0)$  with a period of the order of the Hubble scale during slow roll inflation. The results are quite general and independent of the specific inflationary potentials, depending solely on the ratio of kinetic to potential energy  $\kappa$  and the slow roll parameters  $\epsilon_V, \eta_V$  to leading order in slow roll. For a wide range of  $\kappa$  and the values of  $\epsilon_V, \eta_V$  corresponding to the upper bounds from Planck, we find that the low quadrupole is consistent with the results from Planck, and the oscillations in  $r(k_0)$  as a function of  $k_0$  could be observable if the modes corresponding to the quadrupole and the pivot scale crossed the Hubble radius very few (2 – 3) e-folds after the onset of slow roll.

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