where $B=\frac{25}{54}$ for $\Gamma_\varphi \gtrsim H_{\rm TI}$ (Eq. (4.58)) or $B=\frac{25}{384}$ for $\Gamma_\varphi \ll H_{\rm TI}$ (Eq. (4.62)). Then, our m from Eq. (4.3) gives

$$g_{\rm NL} \simeq B\left[2+\frac{6\alpha-3}{\alpha}\left(\frac{m_0^2 M_P^{2\alpha-2}}{2h^2\psi^{2\alpha}}-1\right)\right. \\ \left. +\frac{(2\alpha^2-\alpha)(\alpha-1)}{\alpha^3}\left(\frac{m_0^4 M_P^{4\alpha-4}}{4h^4\psi^{4\alpha}}-\frac{m_0^2 M_P^{2\alpha-2}}{h^2\psi^{2\alpha}}+1\right)\right] \quad (4.74)$$

In the parameter space available (if any), we will investigate the range of values for $f_{\rm NL}$ and $g_{\rm NL}$.

4.4.3 Constraining the Free Parameters

4.4.3.1 Primordial Inflation Energy Scale

We want the energy scale of primordial inflation to be

$$V^{\frac{1}{4}} \lesssim 10^{14}\ \text{GeV} \quad (4.75)$$

so that the inflaton contribution to the curvature perturbation is negligible. Therefore, from the Friedmann equation $3M_P^2 H_*^2 = V$ we require

$$H_* \lesssim 10^{10}\ \text{GeV} \quad (4.76)$$

4.4.3.2 Thermal Inflation Dynamics

We will consider only the case in which the inflationary trajectory is 1-dimensional, in that only the ϕ field is involved in determining the trajectory of thermal inflation in field space. We do this only to work with the simplest