Configuration	Main Cavity Only	Main Cavity + Harmonic Cavity for Bunch Lengthening	Main Cavity + Harmonic Cavity for Bunch Shortening
Constraints	$k = \phi_N = 0$, $\cos\phi_S > 0$, & $U_0 = eV_0 \sin\phi_s$	1.) Remove the ϕ^2 term in the potential, 2.) Prevent minibuckets; remove ϕ^3 term: $k = \frac{1}{N}\sqrt{\cos^2\phi_s + \frac{1}{N^2}\sin^2\phi_s}$ $\phi_N = \frac{1}{N}\tan^{-1}(\frac{1}{N}\tan\phi_s)$	1.) Maximize the voltage gradient: Set $N\phi_N = 0$, 2.) k is a free parameter, but minibuckets will form for large k depending on the value of $\sin\phi_s$.
Effective Potential $U(\phi)$	$-\cos(\phi+\phi_s)+\cos\phi_s$ $-\phi\sin\phi_s$	$(1-\frac{1}{N^2})[\cos\phi_s - \phi\sin\phi_s] - \cos\phi_s[\cos\phi$ $-\frac{\cos N\phi}{N^2}] + \sin\phi_s[\sin\phi - \frac{\sin N\phi}{N^3}]$	$-\cos(\phi+\phi_s)+\cos\phi_s$ $-\frac{k}{N}[\cos N\phi - 1] - \phi\sin\phi_s$
$U(\phi)$ **for** $\phi \cong 0$	$\frac{\cos\phi_s}{2}\phi^2$	$[N^2-1]\frac{\cos\phi_s}{24}\phi^4$	$\frac{\cos\phi_s}{2}\phi^2\left(1+\frac{Nk}{\cos\phi_s}\right)$
Synchrotron Tune	$\nu_{s0} = \left[\frac{\alpha h\cos\phi_s}{2\pi}\frac{eV_0}{E}\right]^{1/2}$	$\nu_{s0}\frac{2\pi^{3/2}}{\Gamma^2(1/4)}\left[\frac{N^2-1}{6}\right]^{1/2}\phi_{max}$	$\nu_{s0}\left(1+\frac{Nk}{\cos\phi_s}\right)^{1/2}$
Bunch Length	$\sigma_{L0} = \frac{\alpha c}{\Omega_{s0}}\sigma_{\varepsilon 0}$	$\frac{2\sqrt{\pi}}{\Gamma(1/4)}\left(\frac{3}{N^2-1}\right)^{1/4}\left(\frac{h\alpha\sigma_{\varepsilon 0}}{\nu_{s0}}\right)^{1/2}\frac{c}{\omega_{rf}}$	$\sigma_{L0}\left(1+\frac{Nk}{\cos\phi_s}\right)^{-1/2}$