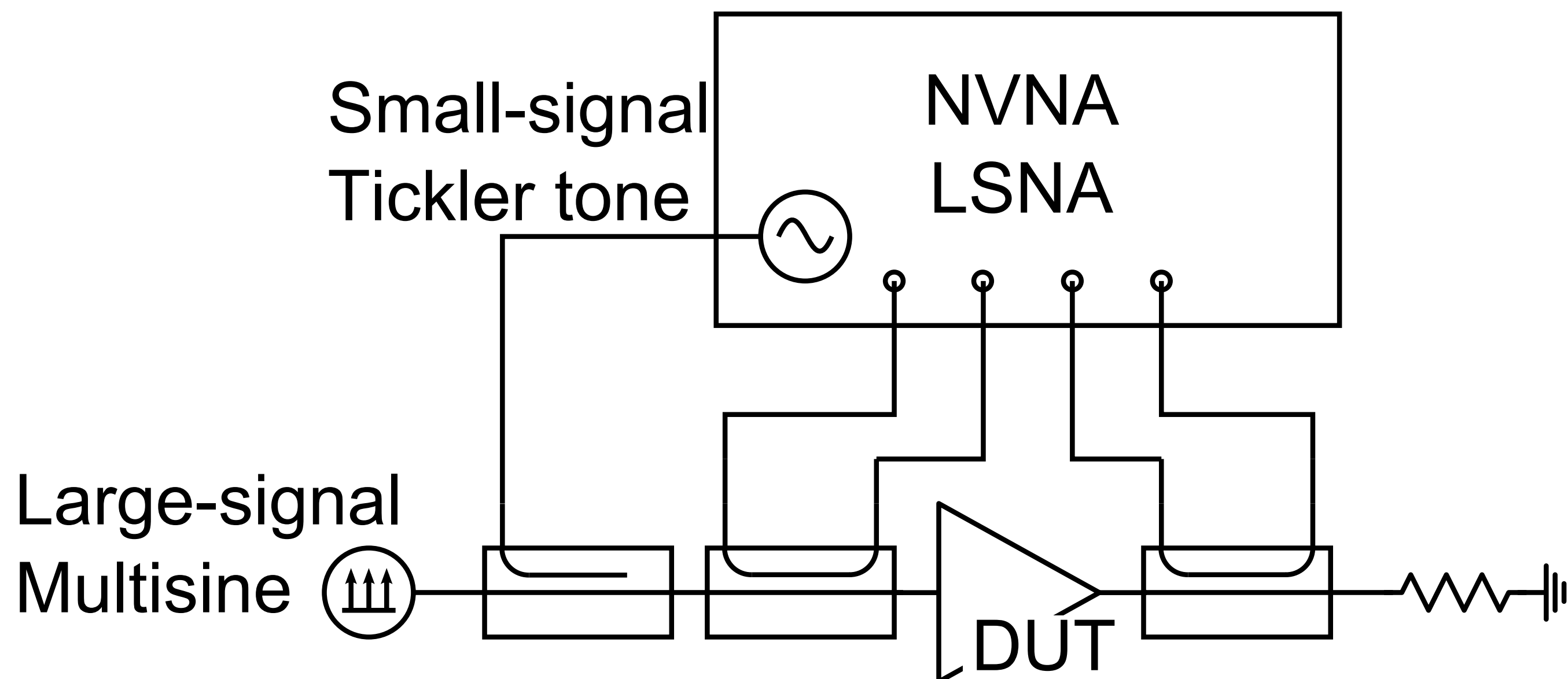


Combining the Large and the Small

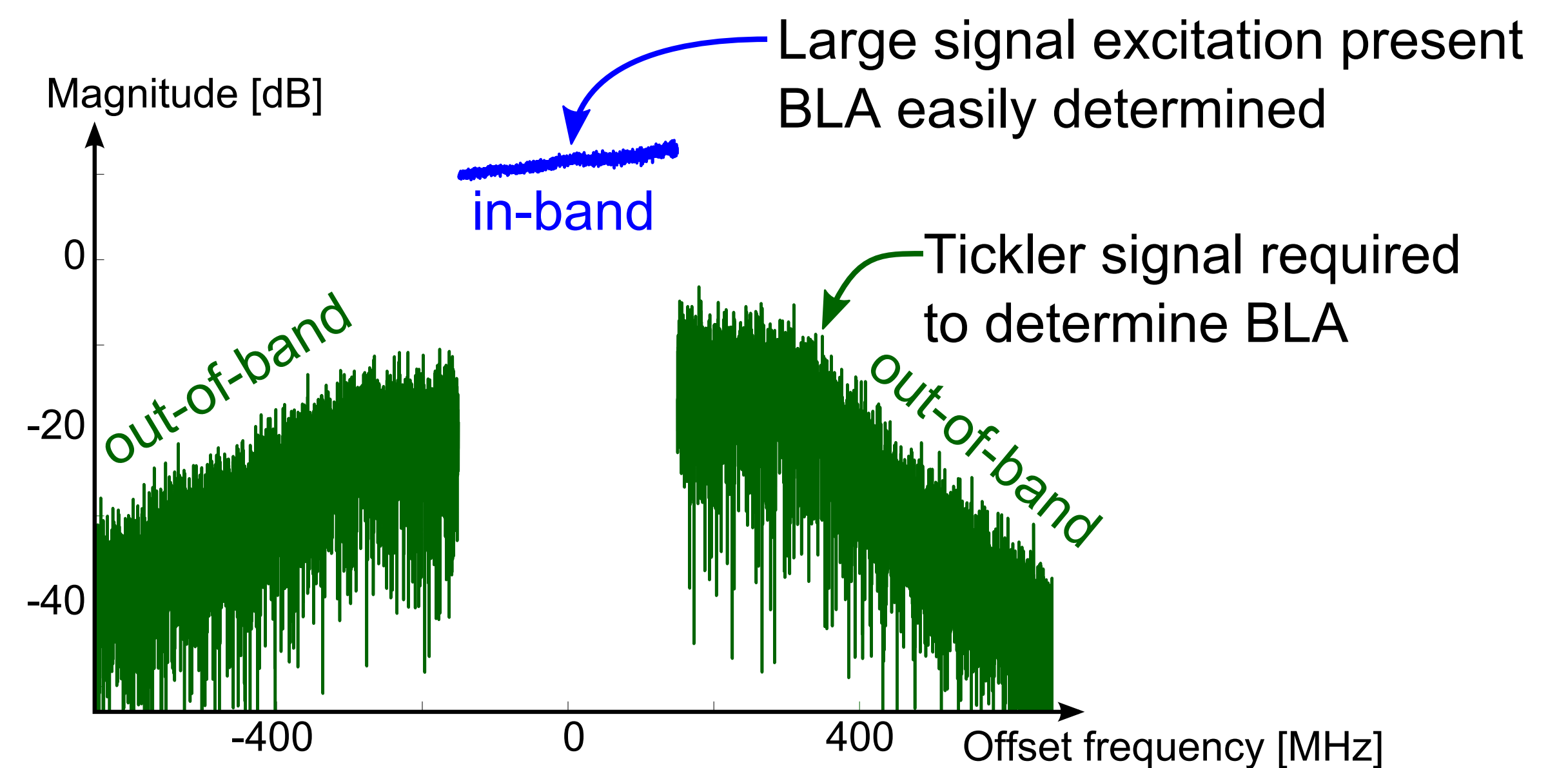
Determining the BLA with tickler tones

Adam Cooman, Yves Rolain, Ebrahim Louarroudi and Gerd Vandersteen

Why small signals together with large signals?



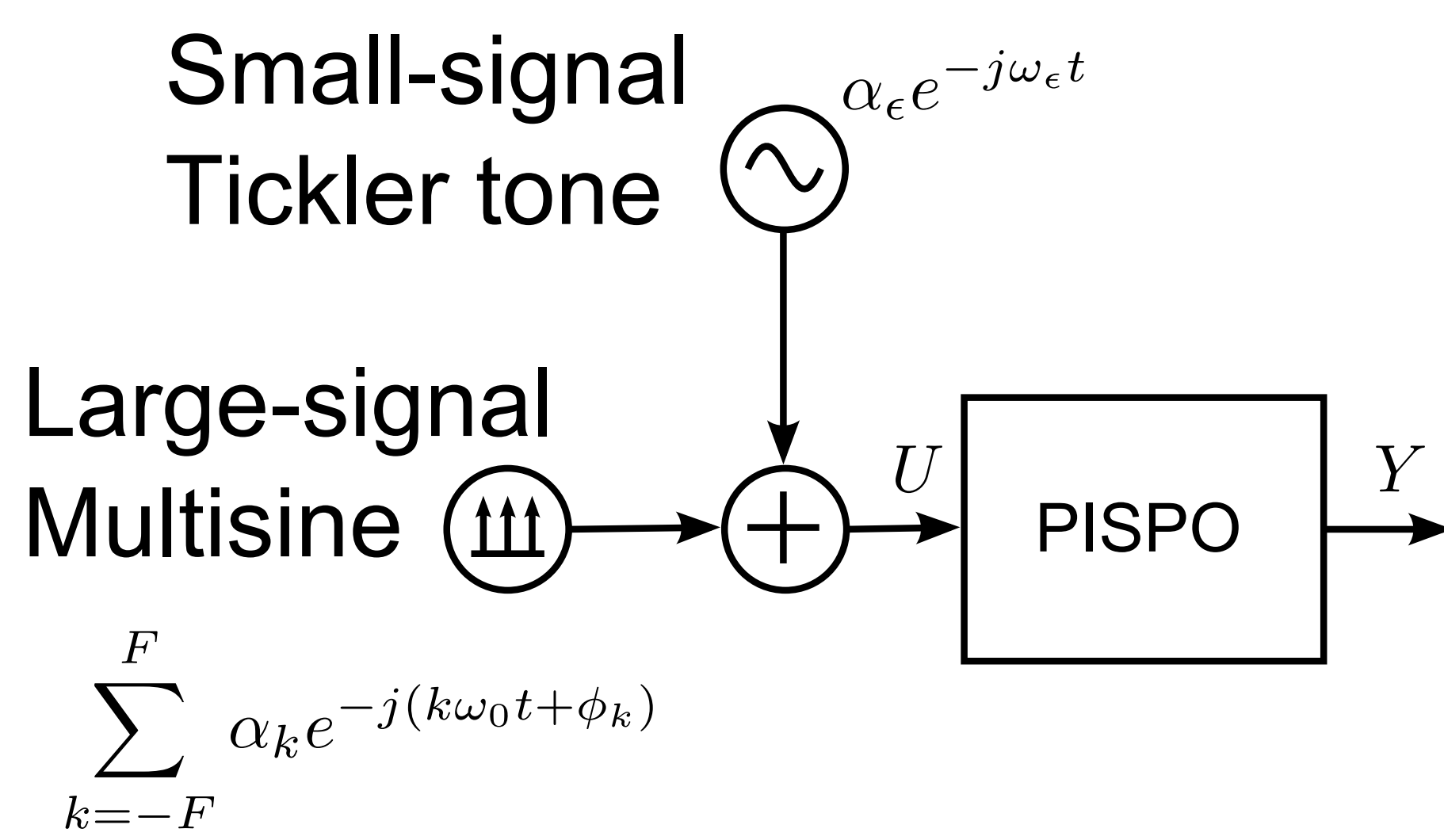
High-frequency PA measurement set-up



Typical output spectrum

Can we use the small-signal to determine the BLA?

Large signal: classic expressions for the BLA



$$Y^{[3]}(\omega_{ms}) = U(\omega_{ms}) \sum_{k_1=-F}^F |U(k_1\omega_0)|^2 H_3(\omega_{ms}, k_1\omega_0, -k_1\omega_0) \quad \text{Coherent Contributions}$$

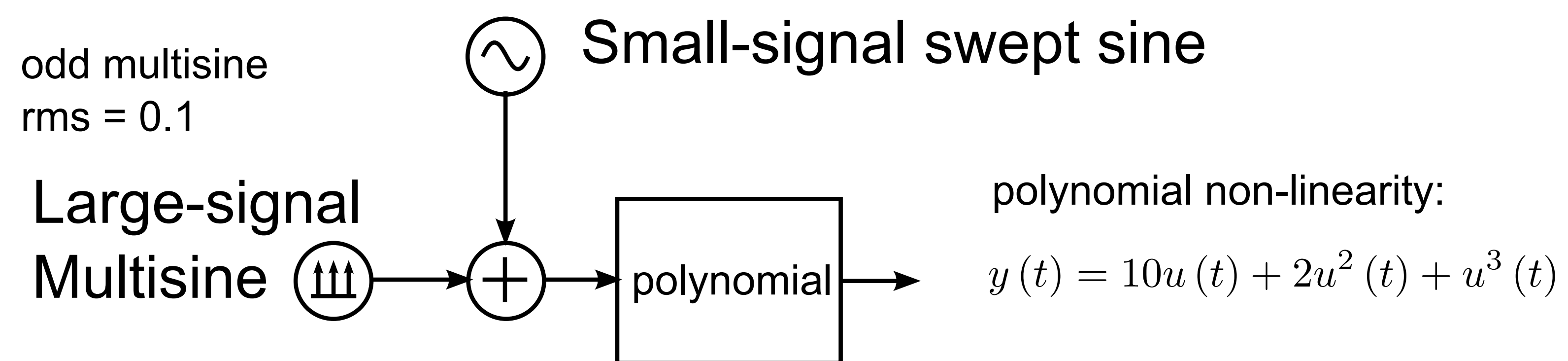
$$+ \sum_{k_1=-F}^F \sum_{\substack{k_2=-F \\ k_2 \neq -k_1}}^F H_3(k_1\omega_0, k_2\omega_0, \omega_{ms} - k_1\omega_0 - k_2\omega_0) U(k_1\omega_0) U(k_2\omega_0) U(\omega_{ms} - k_1\omega_0 - k_2\omega_0) \quad \text{Non-Coherent Contributions}$$

Small-signal: Linearisation around time-varying operating point

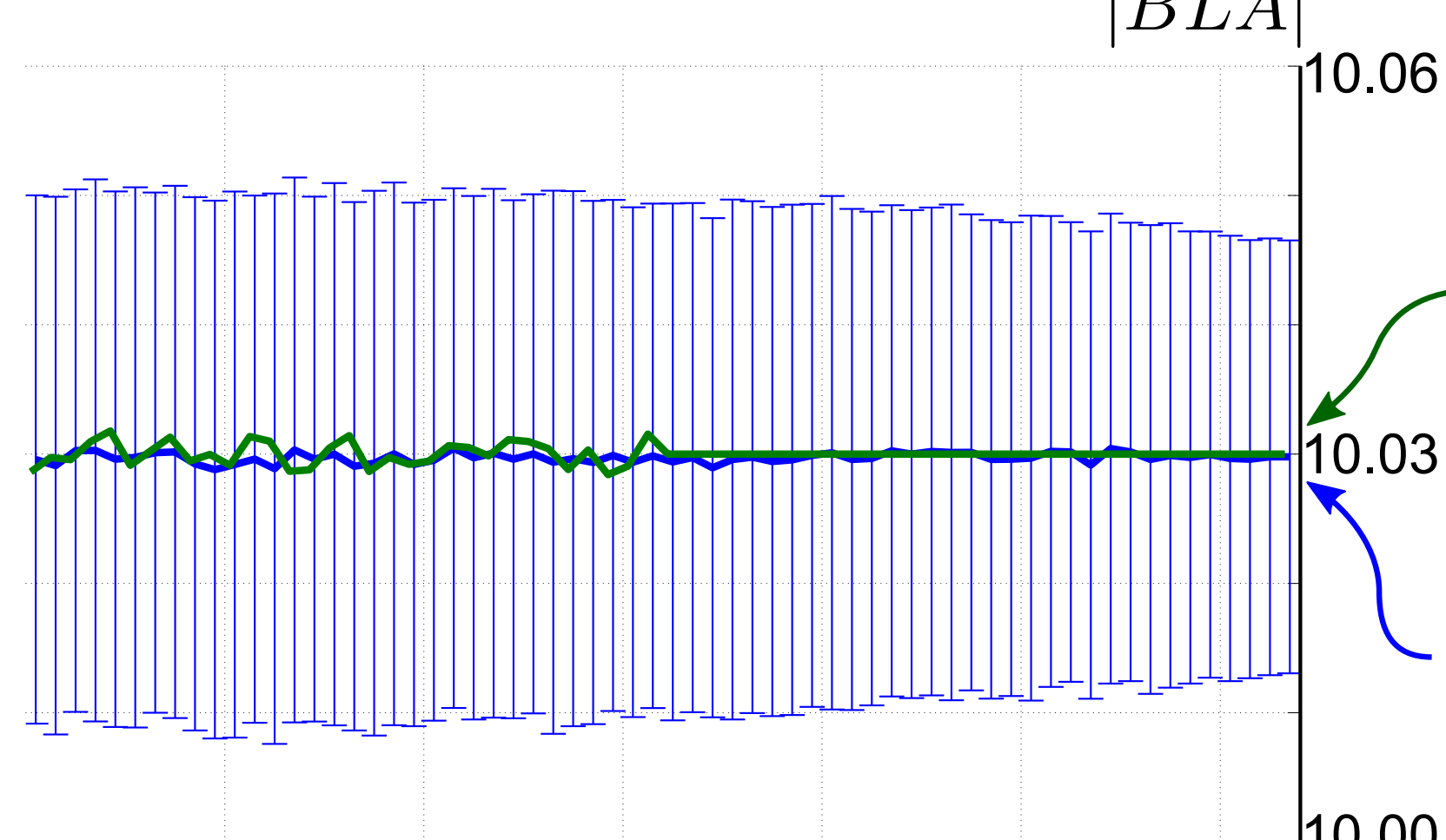
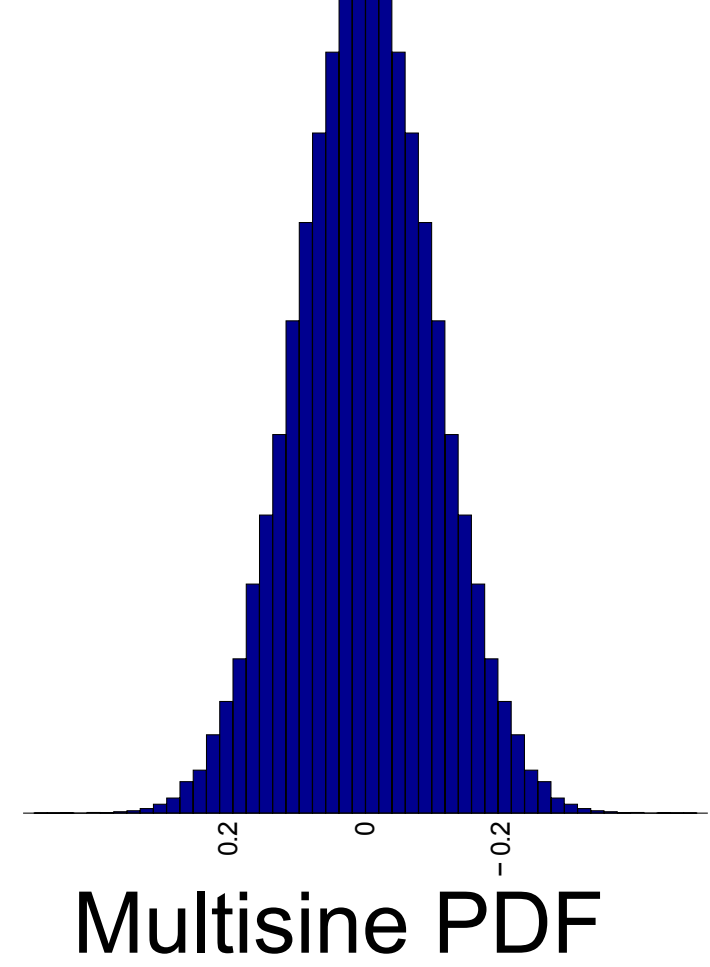
$$Y^{[3]}(\omega_\epsilon) = U(\omega_\epsilon) \sum_{k_1=-F}^F |U(k_1\omega_0)|^2 H_3(\omega_\epsilon, k_1\omega_0, -k_1\omega_0) \quad \text{Only coherent Contributions}$$

corresponds to BLA for random-phase multisines

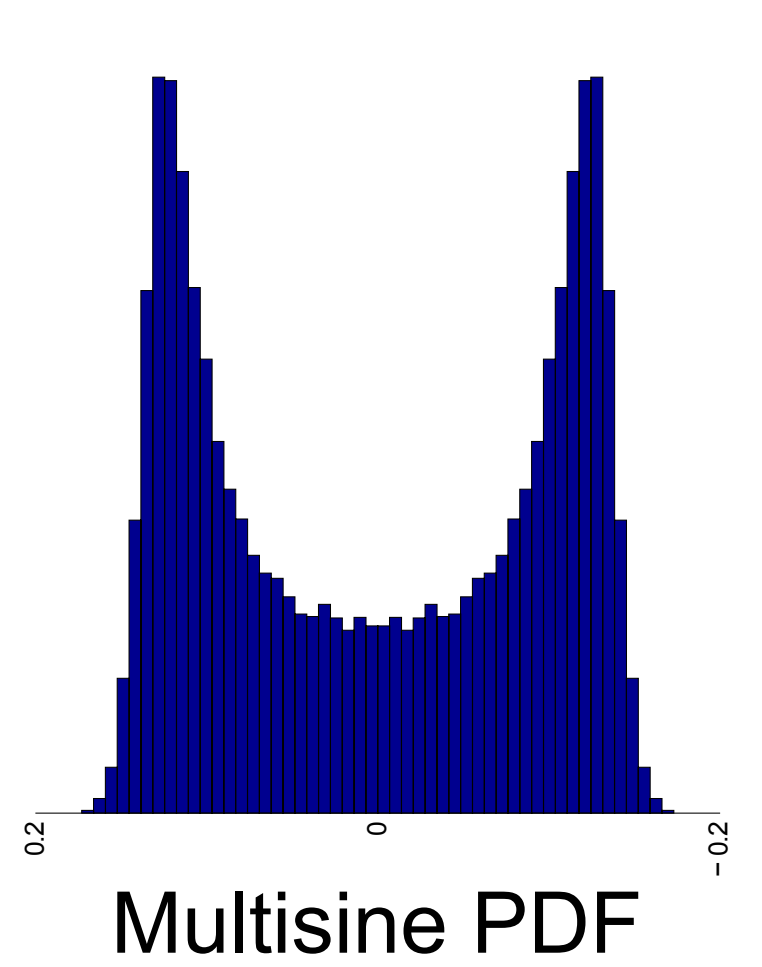
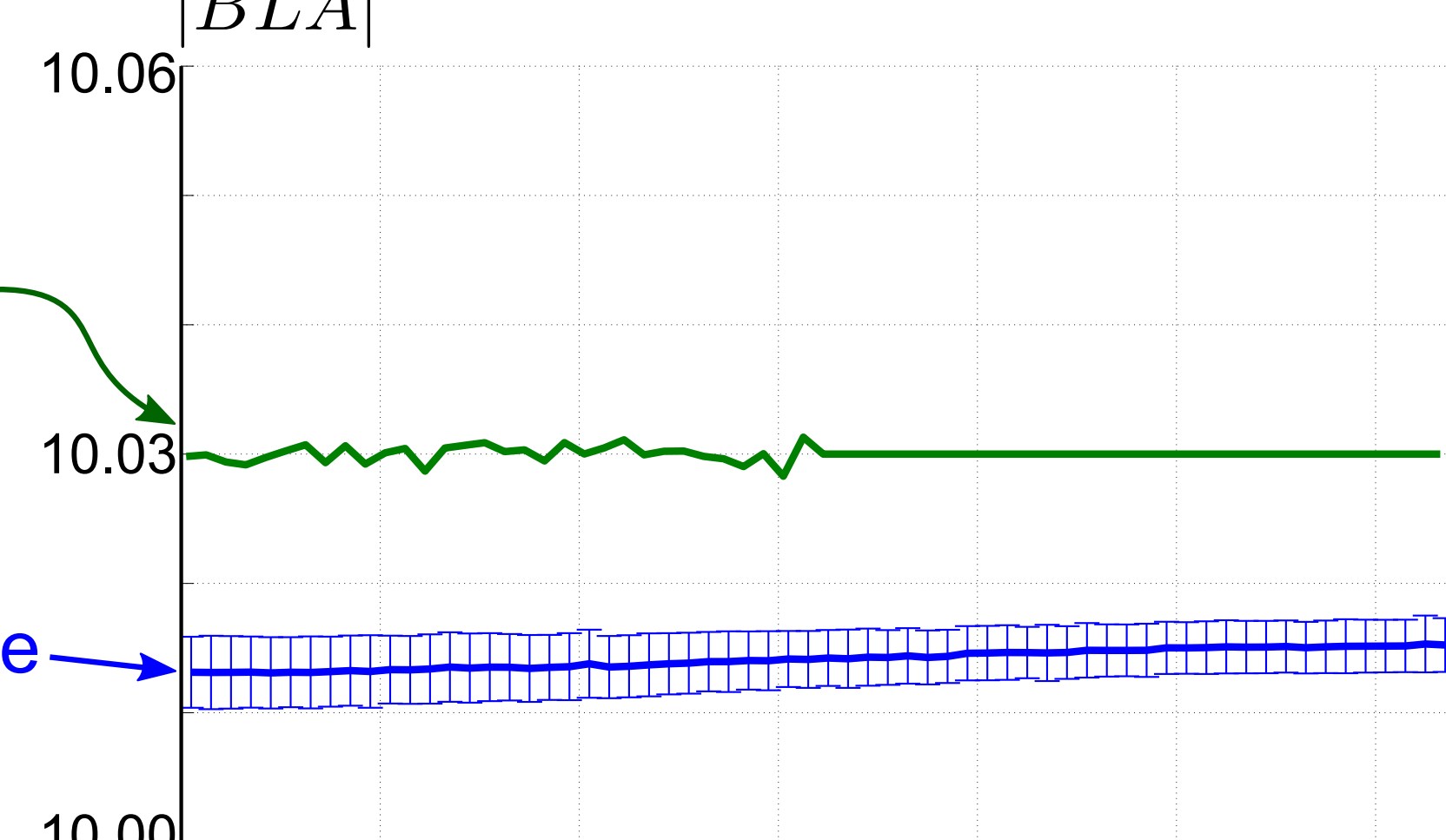
Simulation example



Random-phase multisine



Crest-factor optimised multisine



The small-signal can be used, but only with random phase multisines