A Generalization of Local Non-Gaussianity

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Local form: $\Phi_{\rm NG}(x) = \phi(x) + f_{\rm NL}(\phi^2(x) - \langle\phi^2\rangle)$

Go to Fourier space and let $f_{\rm NL}$ vary with scale:

$$\Phi(k) = \phi(k) + f_{\rm NL}(k) \int \frac{d^3k'}{(2\pi)^3} \phi(k')\phi(k-k')$$

This is motivated by models of inflation (Byrnes, Shandera)

Model this new function as piecewise-constant in k to get a new basis of parameters $f^i_{\rm NL}$

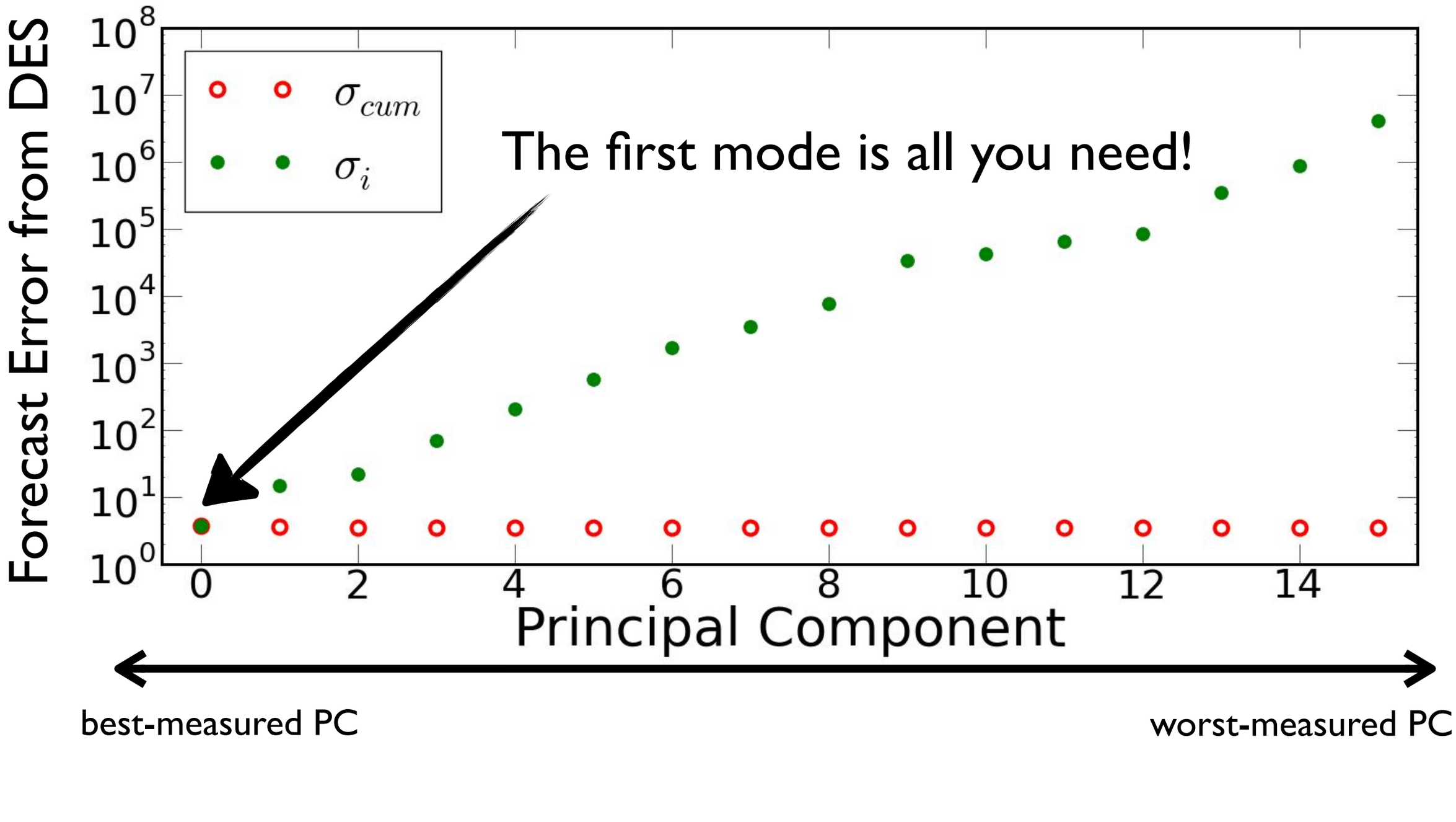
Use MLB formula (Matarrese et al. 1986) to calculate the signature of this model in the dark matter halo bias

Calculate the Fisher matrix to forecast errors on these new parameters $f^i_{\rm NL}$

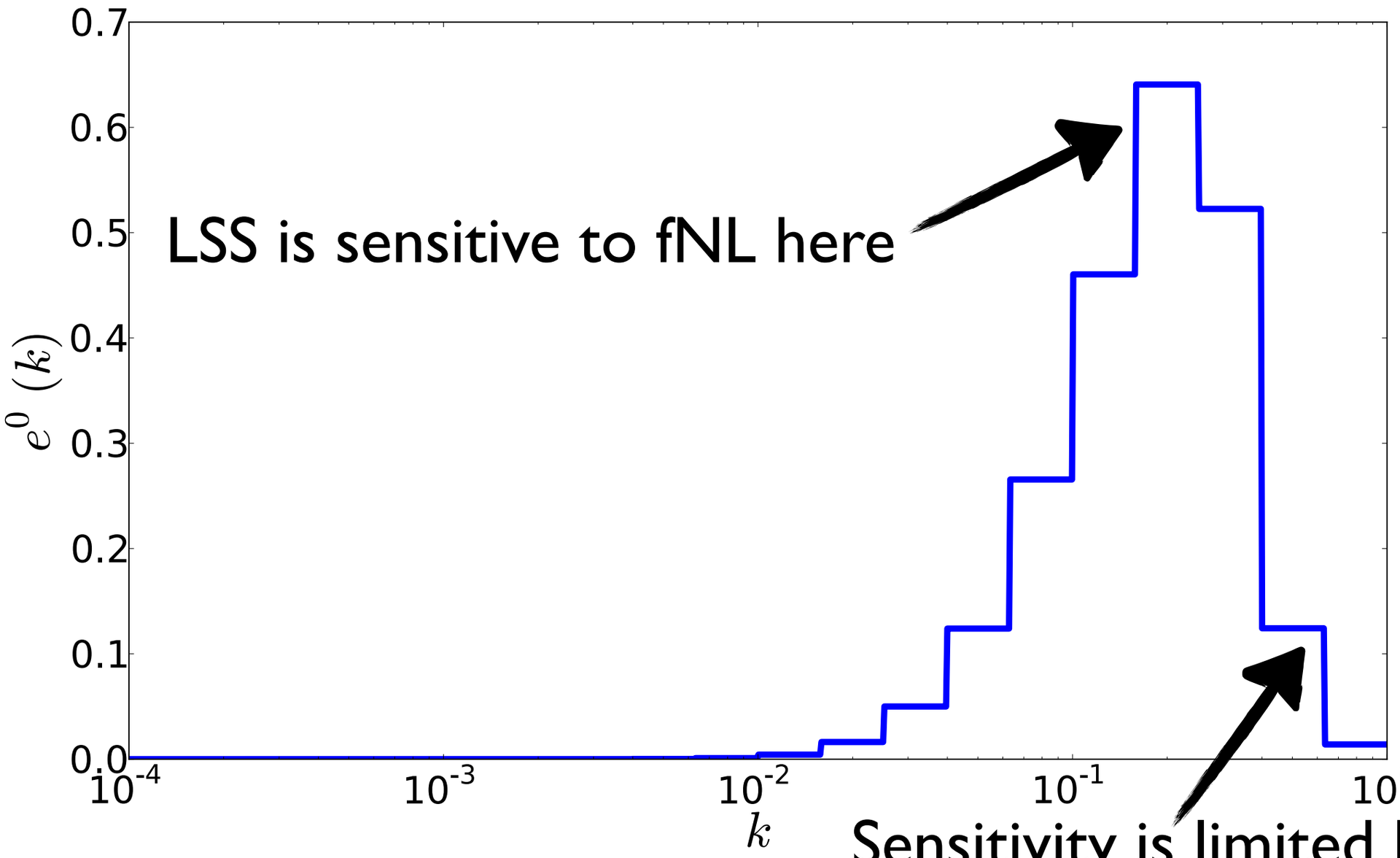
Use principal component analysis: let the ***DATA*** tell us which linear combinations are good!

We can project arbitrary $f_{\rm NL}(k)$ to the $f^i_{\rm NL}$ basis to forecast errors without re-calculating FM

Results!


Forecast Error from DES
10^8
10^7
10^6
10^5
10^4
10^3
10^2
10^1
10^0
σ_{cum}
σ_i
The first mode is all you need!
0
2
4
6
8
10
12
14
Principal Component
best-measured PC
worst-measured PC

Results!



Sensitivity is limited by the maximum k used in the data