Note on the likelihood

The component separation exercise has been performed on sky maps with full lensing contamination.

Suppose that PICO can perform e.g. 60% delensing, then the fraction of residual lensing power will be $A_L = 0.4$ after delensing.

Now for the r forecasts, we do the following shortcut to account for "delensing":

- $C_\ell^{BB,\mathrm{NILC}}$ is corrected for the residual noise bias and the residual lensing bias:

$$C_\ell^{\mathrm{CMB}} + C_\ell^{\mathrm{fgds}} = C_\ell^{BB,\mathrm{NILC}} - C_\ell^{\mathrm{noise}} - A_L C_\ell^{\mathrm{lens}}$$

- Build a simple Gaussian likelihood to fit r only:

$$-2\ln\mathcal{L}(r) = \sum_{\ell=2}^{\ell_{\mathrm{max}}} \left(C_\ell^{\mathrm{CMB}} + C_\ell^{\mathrm{fgds}} - r\,C_\ell^{prim}(r=1)\right) \mathrm{M}_{\ell\ell'}^{-1} \left(C_\ell^{\mathrm{CMB}} + C_\ell^{\mathrm{fgds}} - r\,C_\ell^{prim}(r=1)\right)$$

- The covariance matrix includes cosmic/sample variance of residual lensing signal, residual foregrounds and residual noise (and cross-terms):

$$\mathrm{M}_{\ell\ell} = \frac{2}{(2\ell+1)f_{\mathrm{sky}}}\left(C_\ell^{BB,\mathrm{NILC}} - (1-A_L)C_\ell^{\mathrm{lens}}\right)^2 = \frac{2}{(2\ell+1)f_{\mathrm{sky}}}\left(C_\ell^{\mathrm{CMB}} + A_L C_\ell^{\mathrm{lens}} + C_\ell^{\mathrm{fgds}} + C_\ell^{\mathrm{noise}}\right)^2$$

Expected residual lensing cosmic variance