

Constraining Dark Energy with Cosmic Magnification

Théodore NICOLAS

Software by A. Boucaud

Inputs:

- Fiducial cosmology
- Survey size and characteristics
- Choice of redshifts bins

Outputs:

- Power spectra of cosmic magnification
- Predicted error ellipses on cosmological parameters

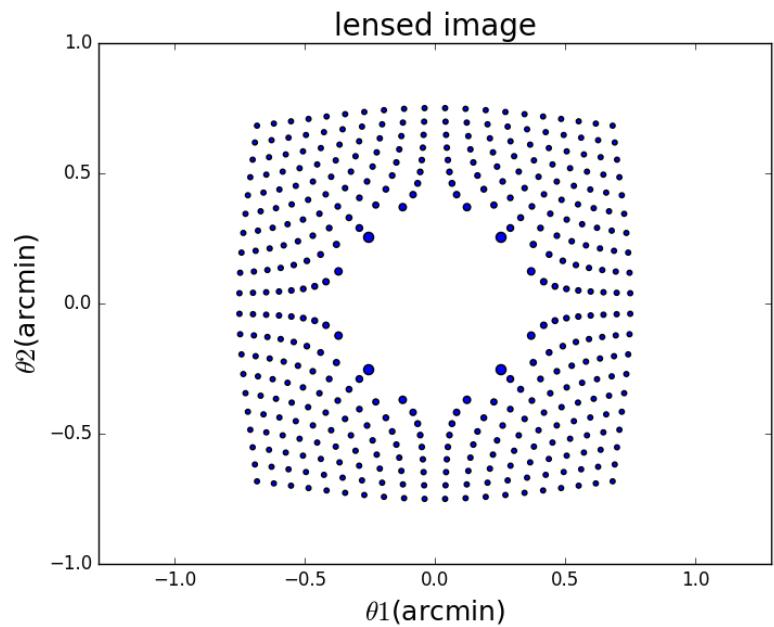
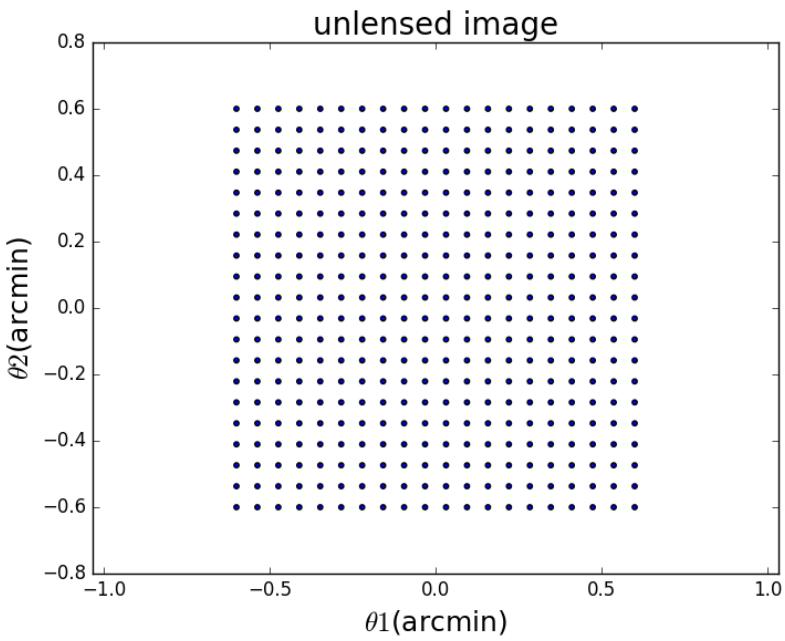
Goals:

- To predict constraints on dark energy equation of state
- To simulate systematics errors like photometric redshift unaccuracy

Cosmic Magnification

Two effects in the weak limit:

- Flux of distant sources is increased
- Solid angle is stretched, diluting the surface density of sources images on the sky



Cross-correlation

Object number density contrast

$$\delta n(\theta) = \boxed{\delta n_g(\theta)} + \boxed{\delta n_m(\theta)} + \boxed{\delta n_{sn}(\theta)}$$

clustering lensing noise (finite
number of object)

Angular cross-correlation :

$$w^{(ij)}(\theta) = \langle \delta n^i(\phi) \delta n^j(\theta + \phi) \rangle$$

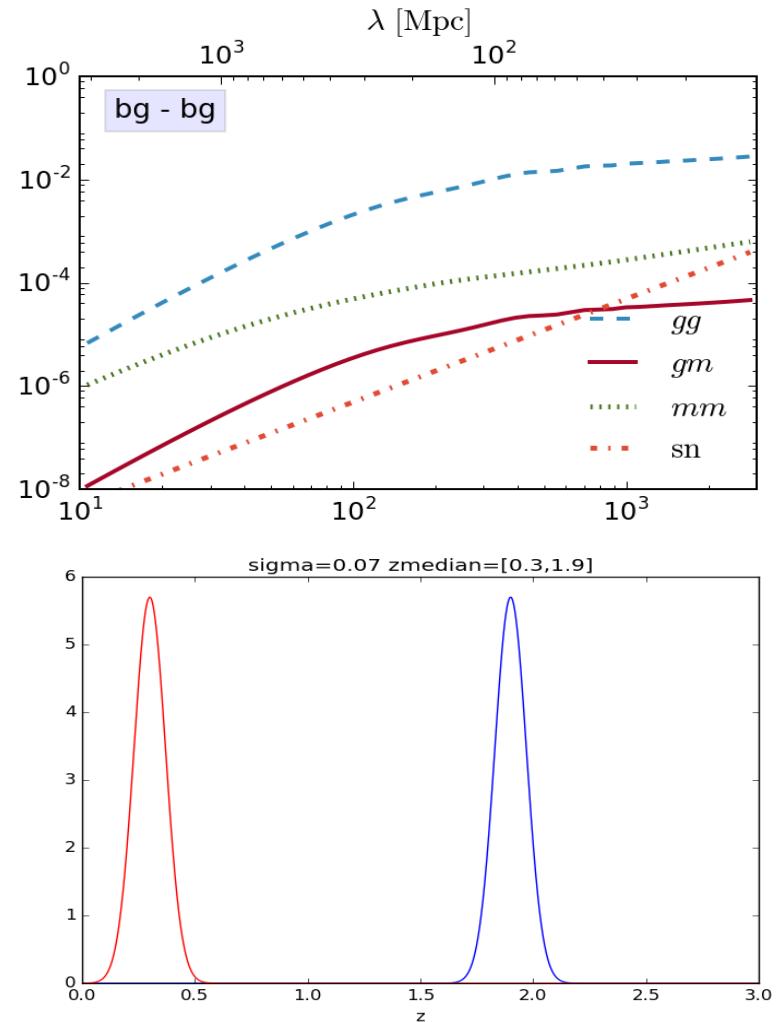
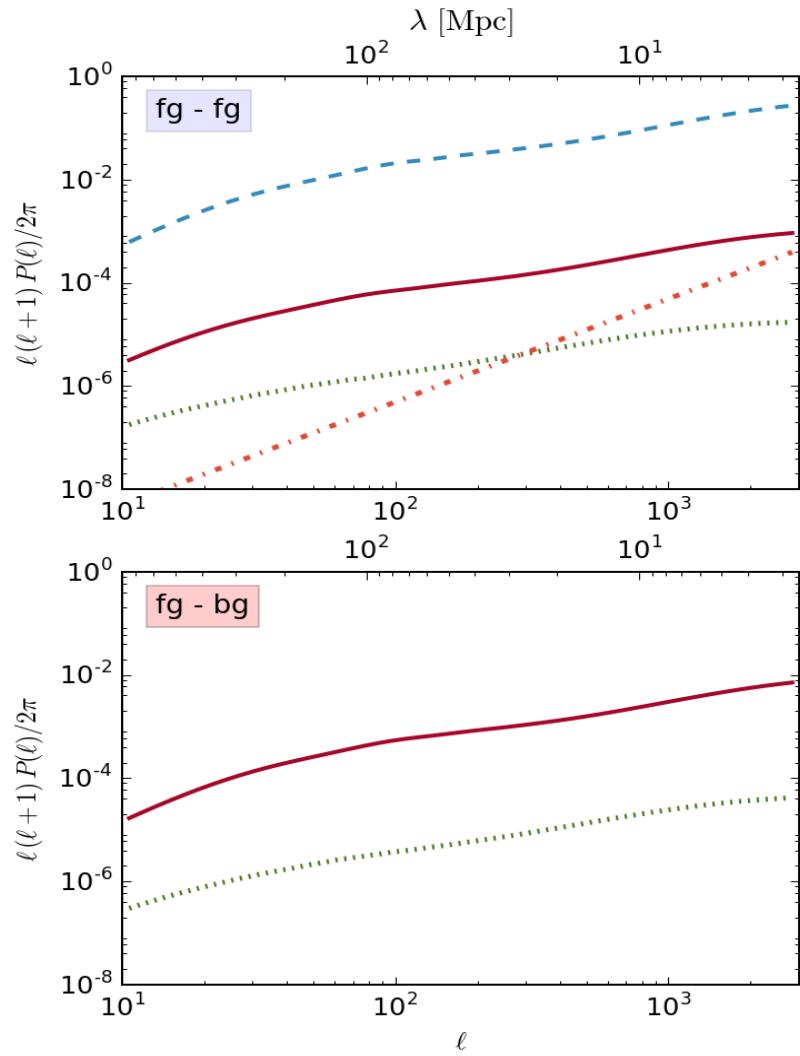
$$w^{(ij)}(\theta) = w_{gg}^{(ij)}(\theta) + w_{gm}^{(ij)}(\theta) + w_{mg}^{(ij)}(\theta) + w_{mm}^{(ij)}(\theta) + \delta_K^{ij} w_{sn}^{(ij)}(\theta)$$

Associated power spectrum :

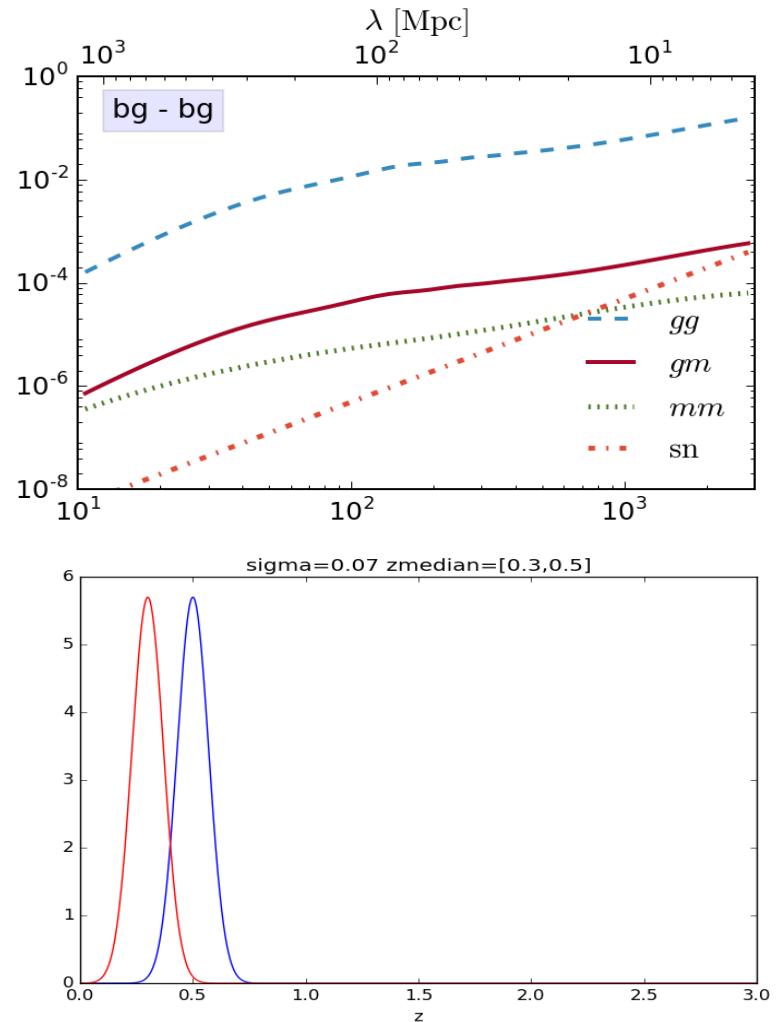
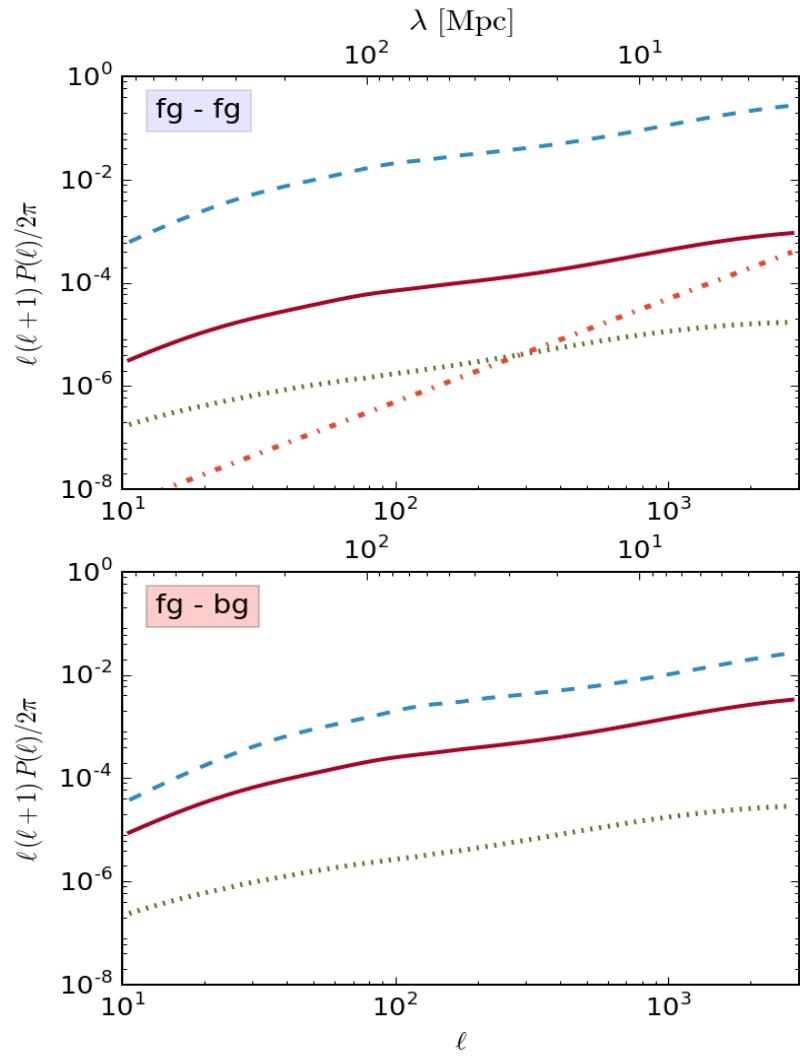
$$P_{xy}^{(ij)}(\ell) = \int d^2\theta w_{xy}^{(ij)}(\theta) e^{i\vec{\ell}\cdot\vec{\theta}}$$

$$P^{(ij)}(\ell) = P_{gg}^{(ij)}(\ell) + 2P_{gm}^{(ij)}(\ell) + P_{mm}^{(ij)}(\ell) + P_{sn}^{(ij)}(\ell)$$

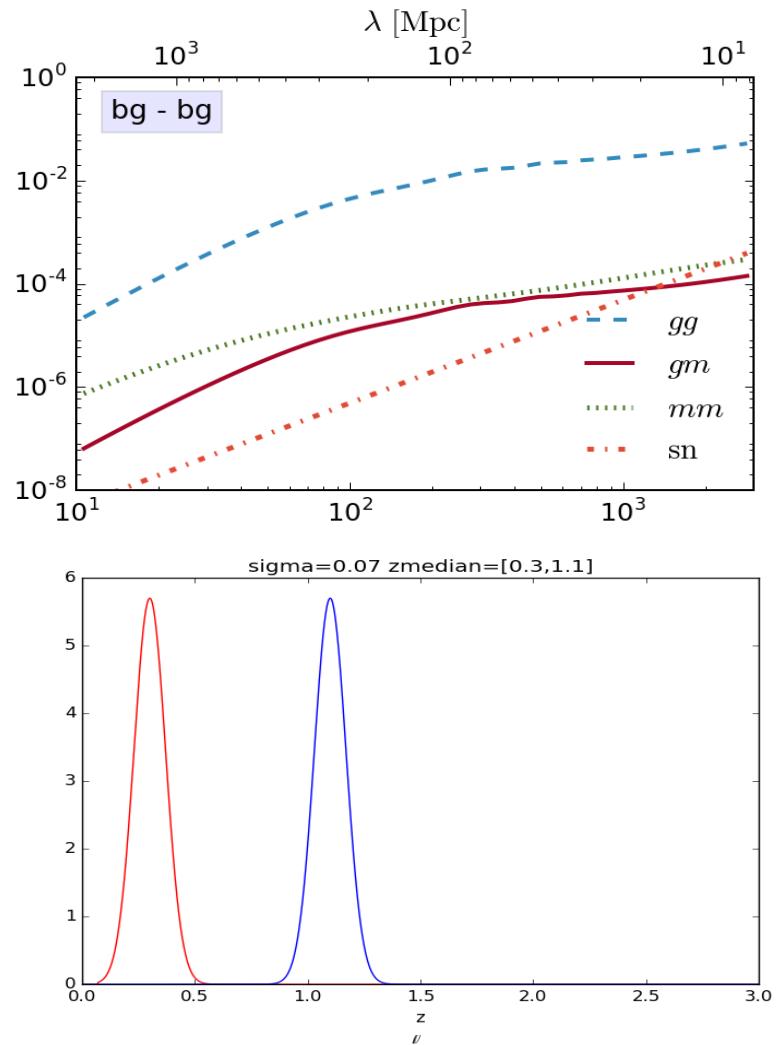
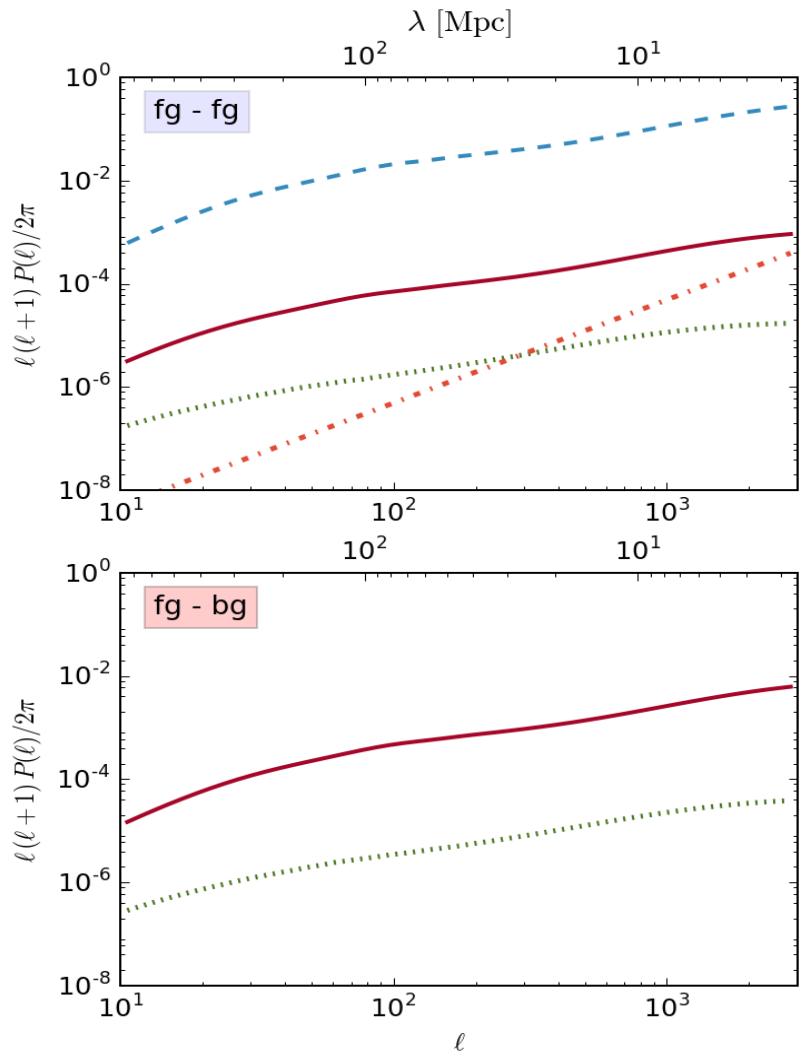
Influence of size and position of redshift bins



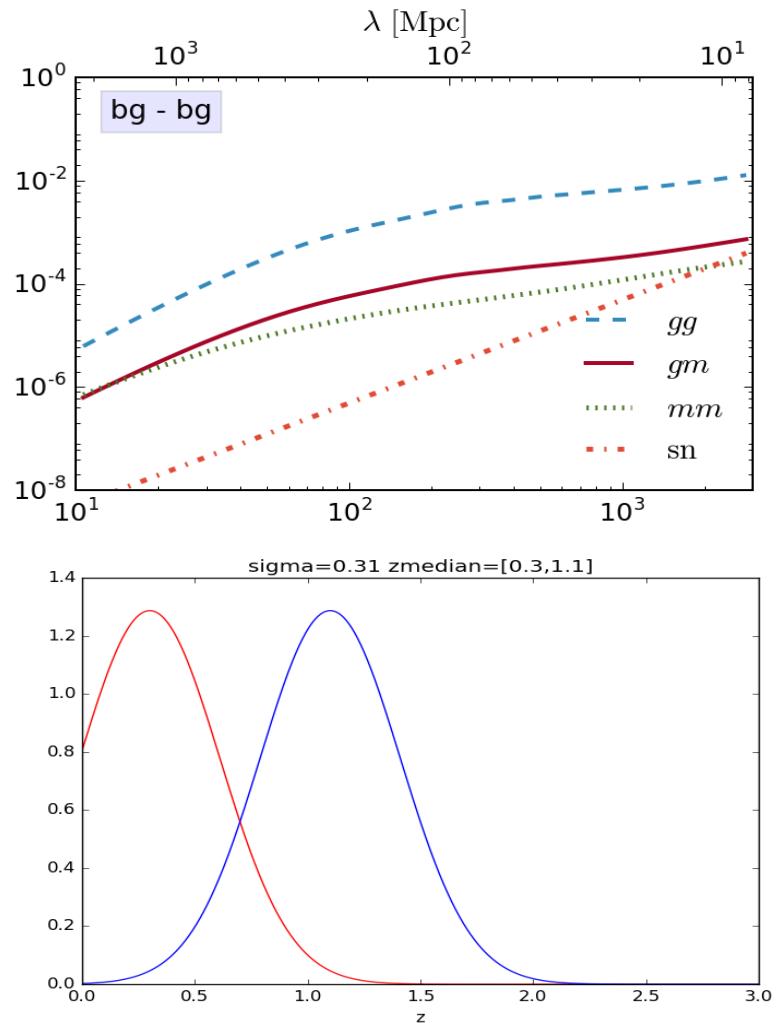
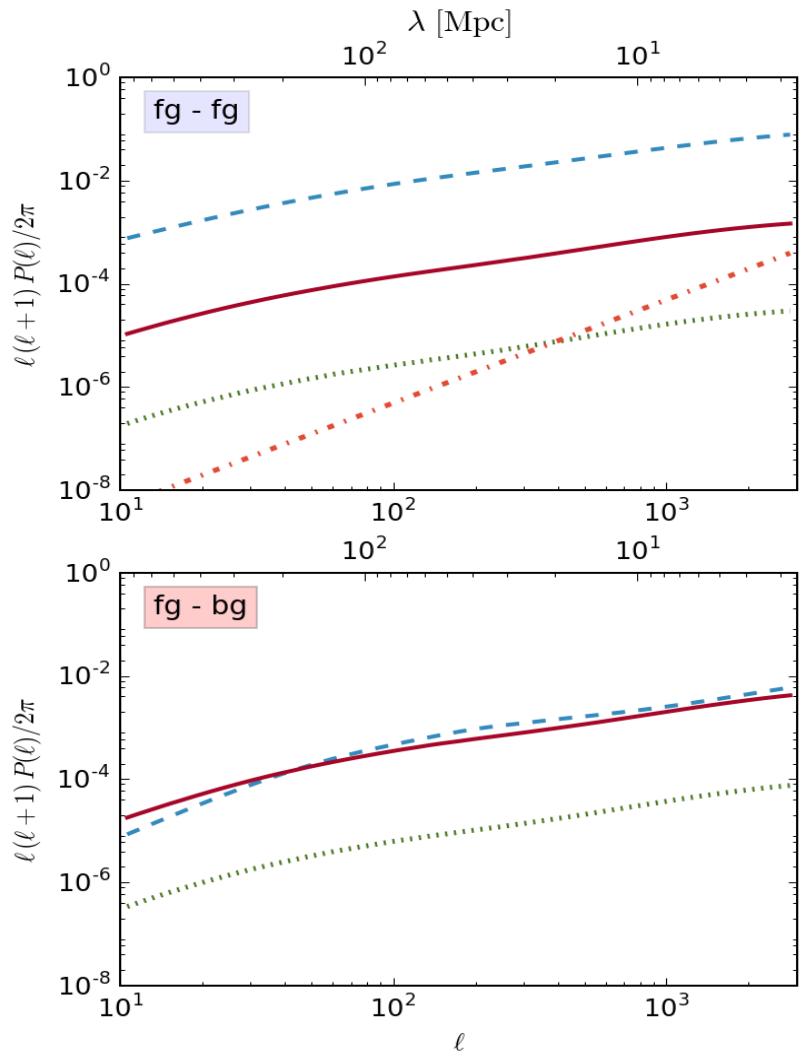
Influence of size and position of redshift bins



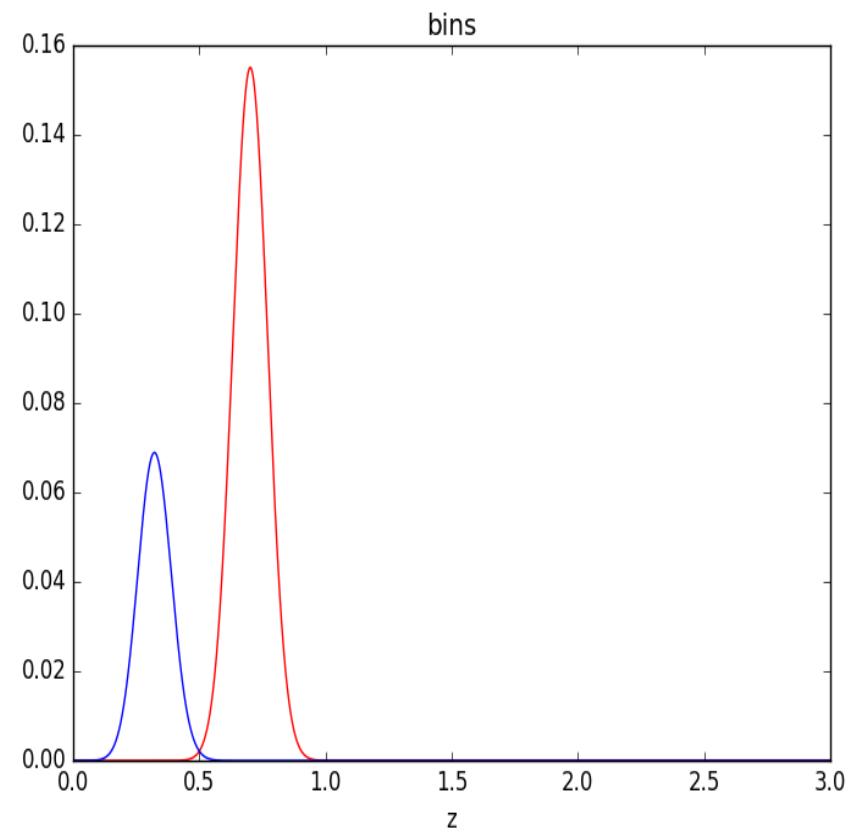
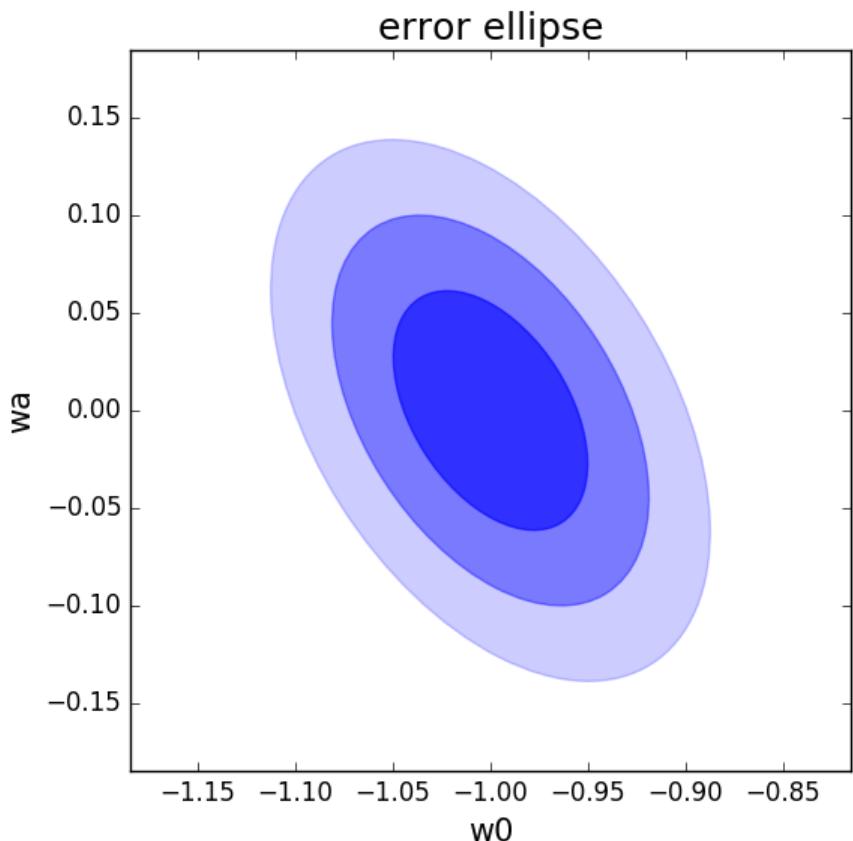
Influence of size and position of redshift bins



Influence of size and position of redshift bins



Fisher Error Ellipses (preliminary)



Conclusion

- A. Boucaud's code understood
- Play with bins shape and position started
- Need to:
 - Set realistic photometric redshift errors
 - Play with tomographic configuration