Lensing ratios in the Precision Cosmology Era

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CosmoVerse Sofia

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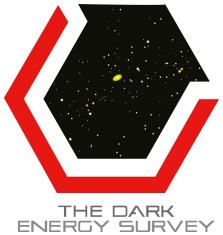

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CSIC Consejo Superior de Investigaciones Científicas

IEEC

"la Caixa" Foundation

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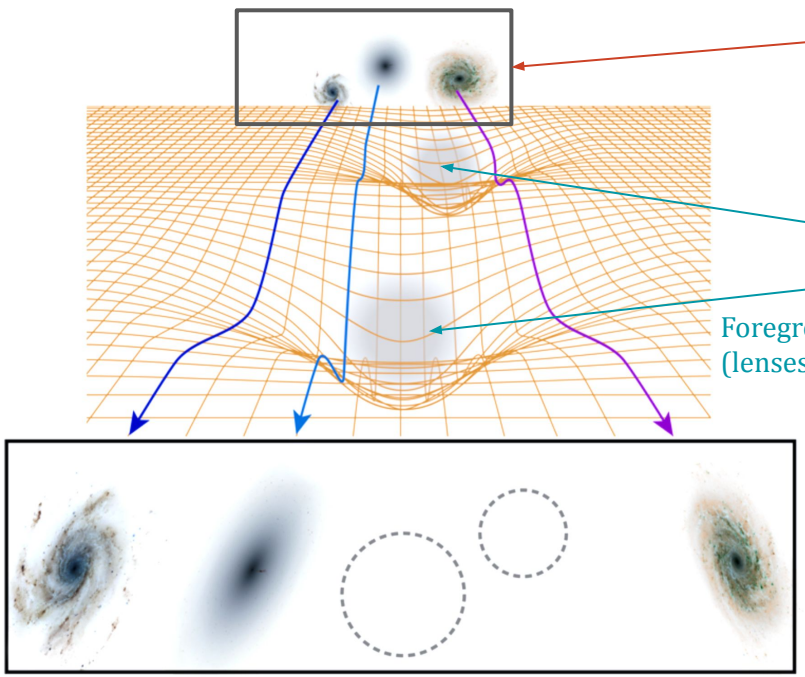
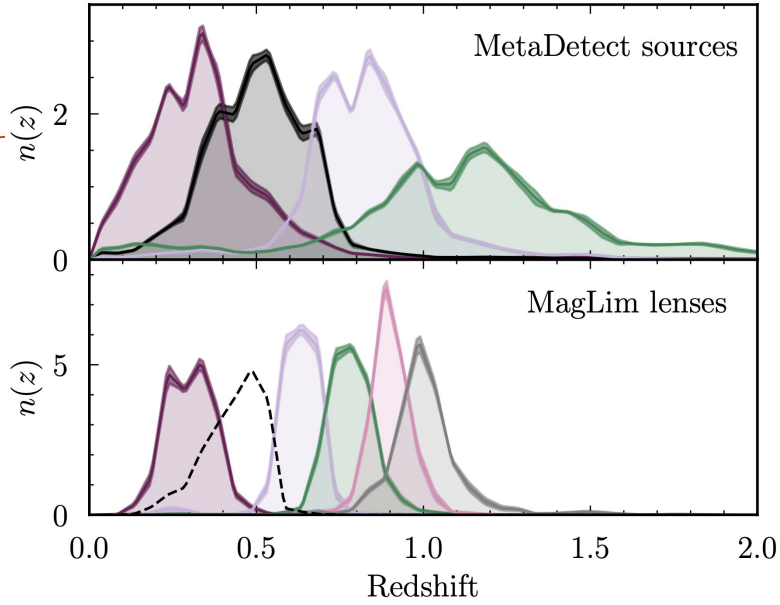
Large Scale Structure

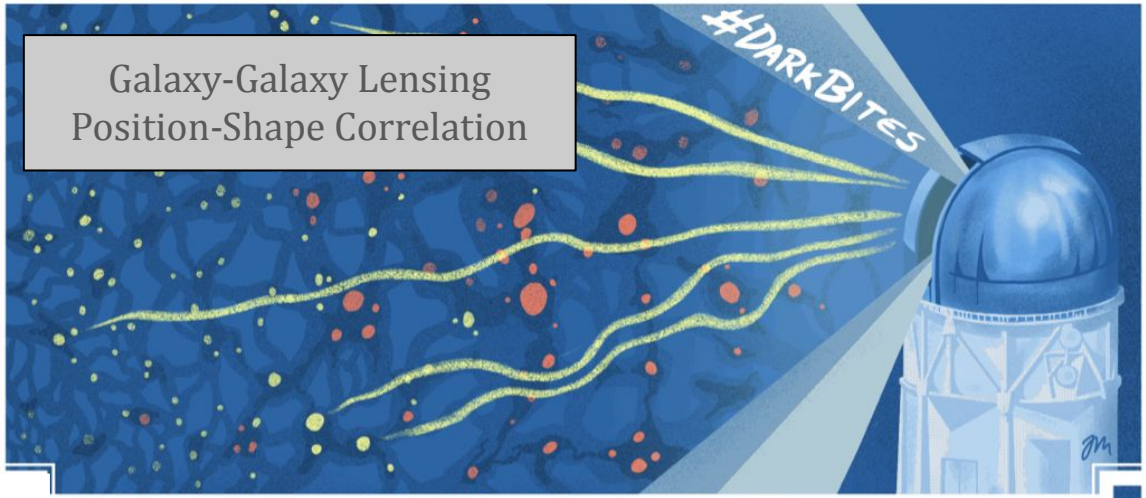


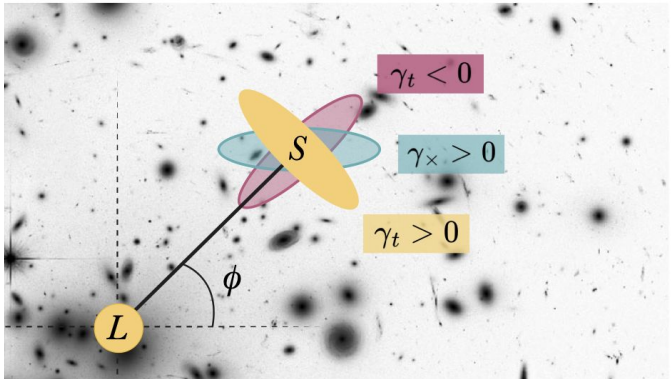
DESY6 Redshifts:

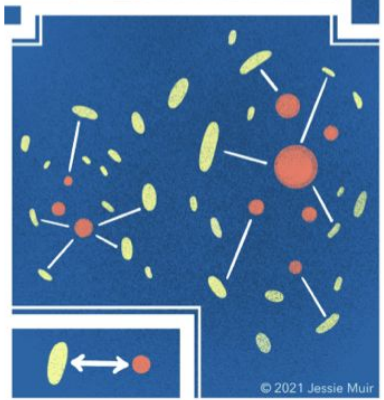
DESY6 GGL: 2601.15175



Shear Ratios







$$\gamma_t = \frac{\Delta\Sigma}{\Sigma_{\rm crit}}$$

So what is Shear Ratio (SR)?

Ratio between two galaxy-galaxy lensing (lensing position x source shape) **using the same lens and different sources**

$$\mathrm{SR} = (l, s_i, s_j)$$

$$\frac{\gamma_t^{l,s_i}}{\gamma_t^{l,s_j}} \simeq \frac{\Sigma^{-1\ l,s_i}_{\rm crit,eff}}{\Sigma^{-1\ l,s_j}_{\rm crit,eff}}$$

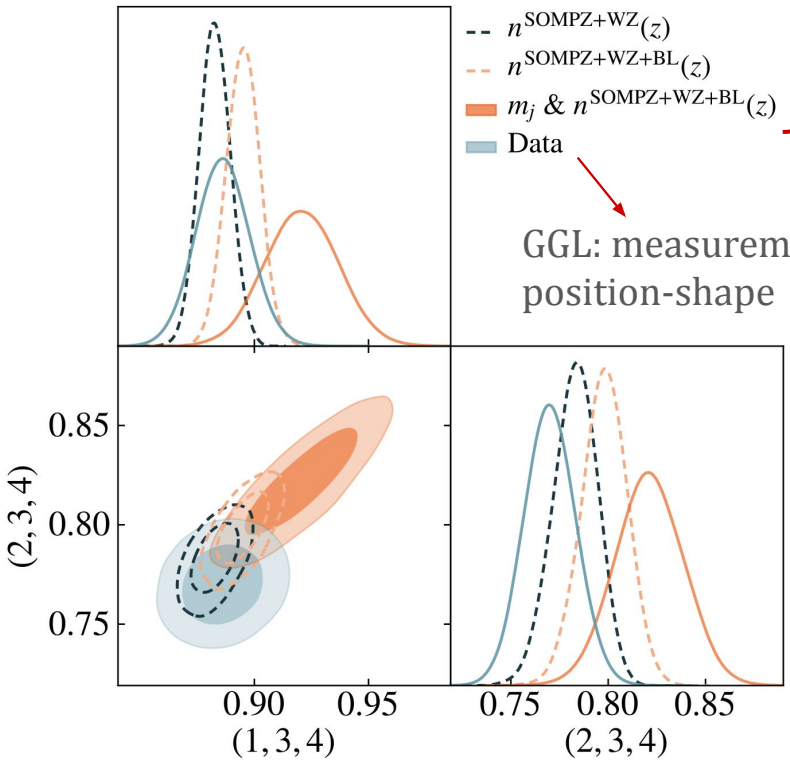
$$\Sigma^{-1\,i,j}_{\rm crit,eff} = \int_0^{z_l^{\rm max}} dz_l \int_0^{z_s^{\rm max}} dz_s\, n_l^i(z_l)\, n_s^j(z_s)\, \Sigma^{-1}_{\rm crit}(z_l, z_s)$$

Dark Energy Survey Y6: Shear Ratios

DESY6 GGL: 2601.15175

$$\mathrm{SR} = (l, s_i, s_j)$$

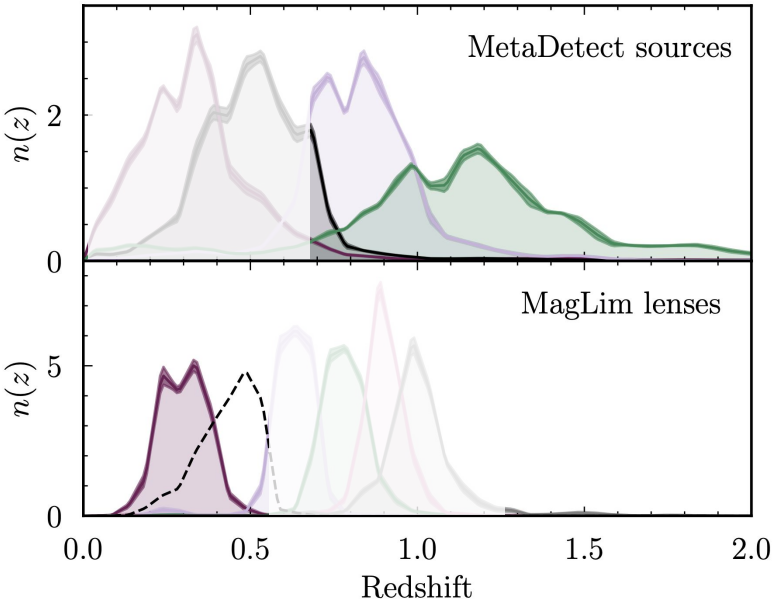
Shear Ratios in DESY6 were used for Redshift and Shear Calibration



$$\frac{\gamma_t^{l,s_i}}{\gamma_t^{l,s_j}} \simeq \frac{\Sigma_{\mathrm{crit,eff}}^{-1\ l,s_i}}{\Sigma_{\mathrm{crit,eff}}^{-1\ l,s_j}}$$

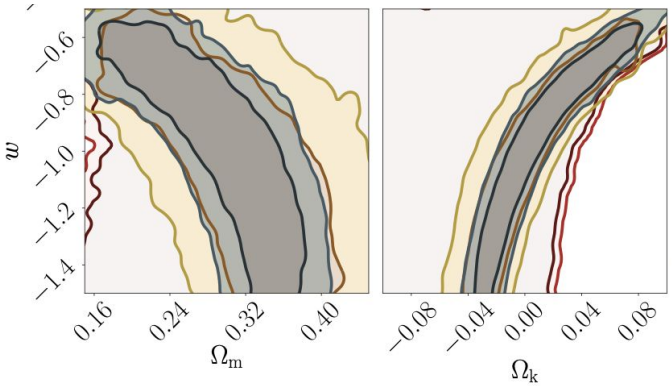
GGL: measurement position-shape

DESY6 Redshifts:



Lensing Ratios

Previous forecasting for LSST and Simons Observatory



Planck prior
Planck prior, $\Omega_k = 0$
DESI + LSST + CMB S4
LSST + CMB S4
LSST + CMB S4, $\Omega_k = 0$

From Prat+18 (1810.02212)

Current work:

DESY6 galaxies + CMB lensing from ACT DR6 to obtain cosmological constraints with lensing ratios