eBOSSxDES project 530

« Probing gravity with combination of RSD and galaxy-galaxy lensing of ELG, LRG and DES weak-lensing »

Eric Jullo

Aix-Marseille Univ., LAM

eBOSS/DESI France meeting, CEA-Saclay, May 7th, 2019

Combining CMASS & GGL

de la Torre et al. (2017), Jullo et al. (2019)

28,039 CMASS galaxies on 338 deg^2 *(83 deg^{-2})*

Weak-Lensing from CFHT-Stripe 82
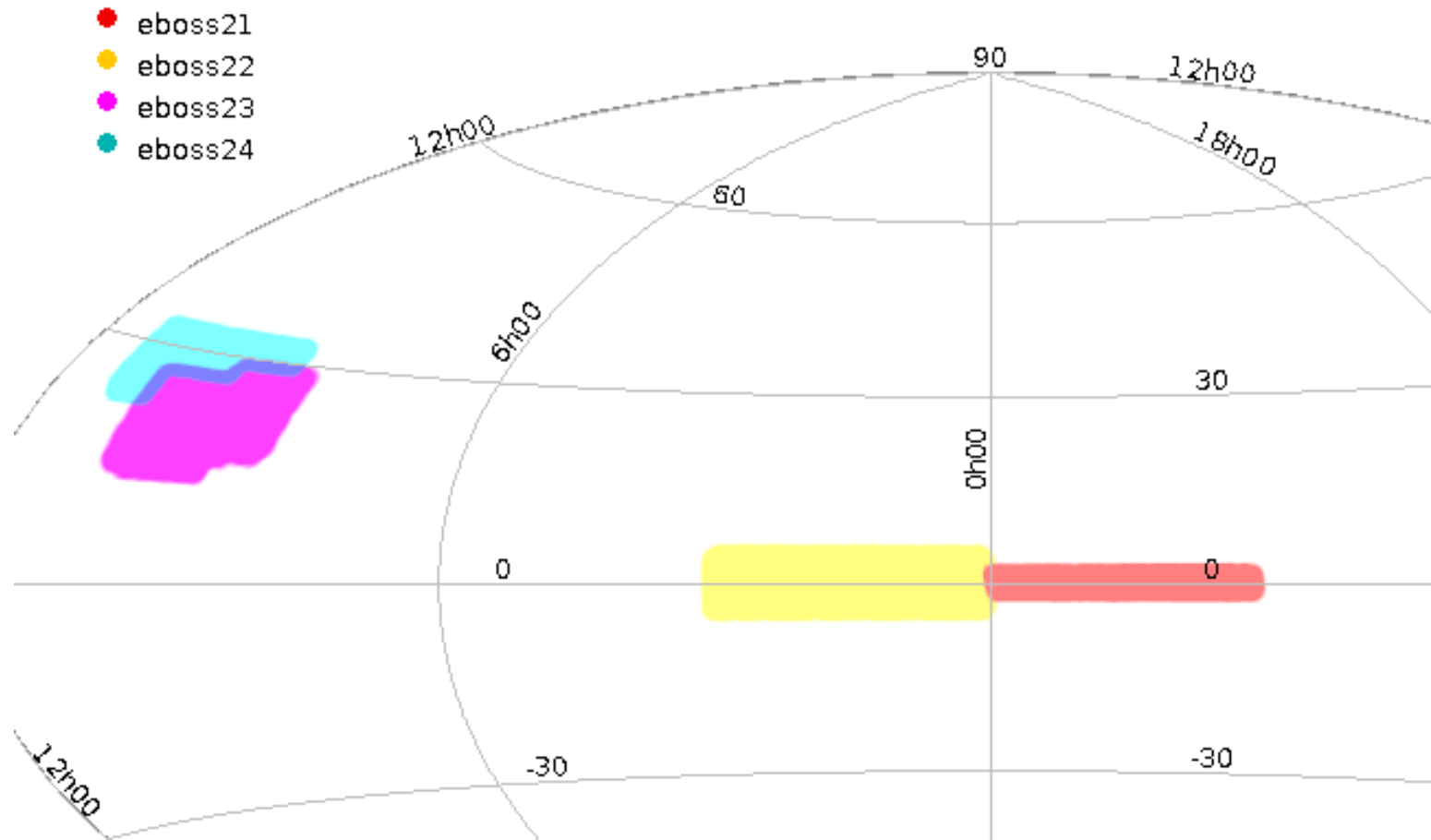- i < 22.5, zmed=0.58
- 5.4 gal.arcmin^{-2}

and CFHTLenS
- i < 25.5, zmed = 0.70
- 7.7 gal.arcmin^{-2}

Our model can reproduce small scales (<5% bias on Ω_M with R_0=1 Mpc/h, s_{min}=18Mpc/h)

2
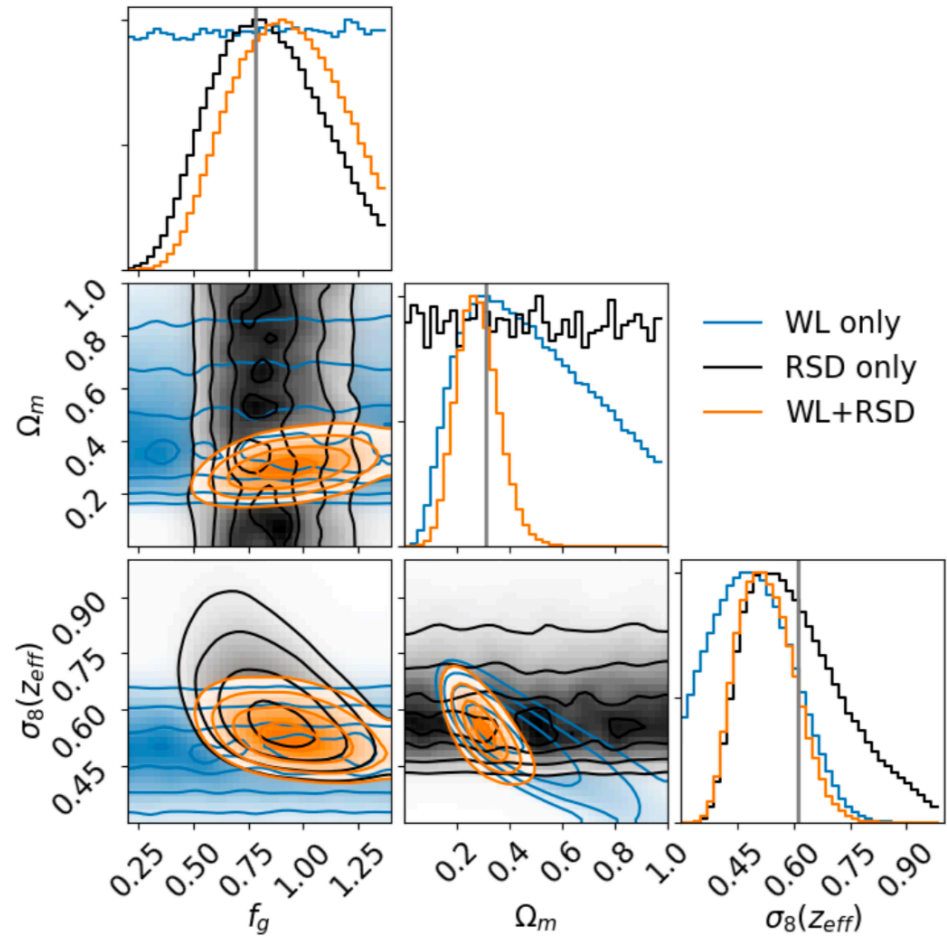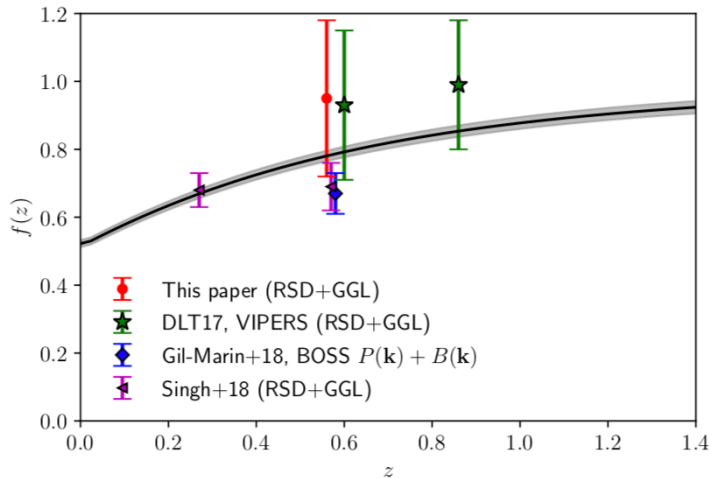
eBOSS catalogue ELG

eBOSS catalogue LRG v4

DES footprint

DES OBSERVING STRATEGY

600 deg2 overlap in the Stripe 82

☐ DES (planned 5 yrs)   ▨ DES (SV)   ▮ DES (Y1)   ▮ DES (Y2)   ☐ DES (SN fields)

Y3
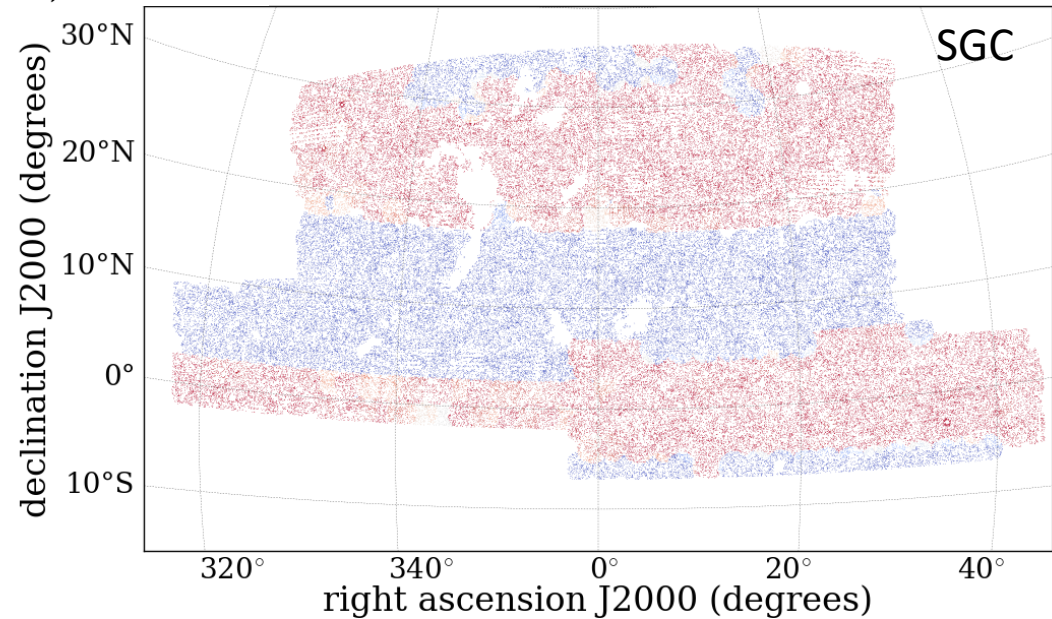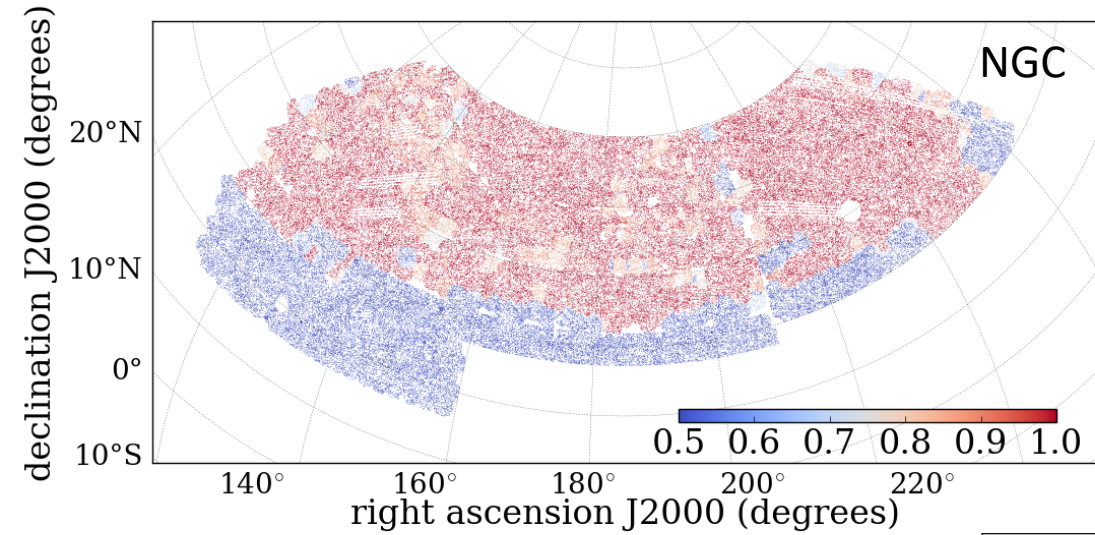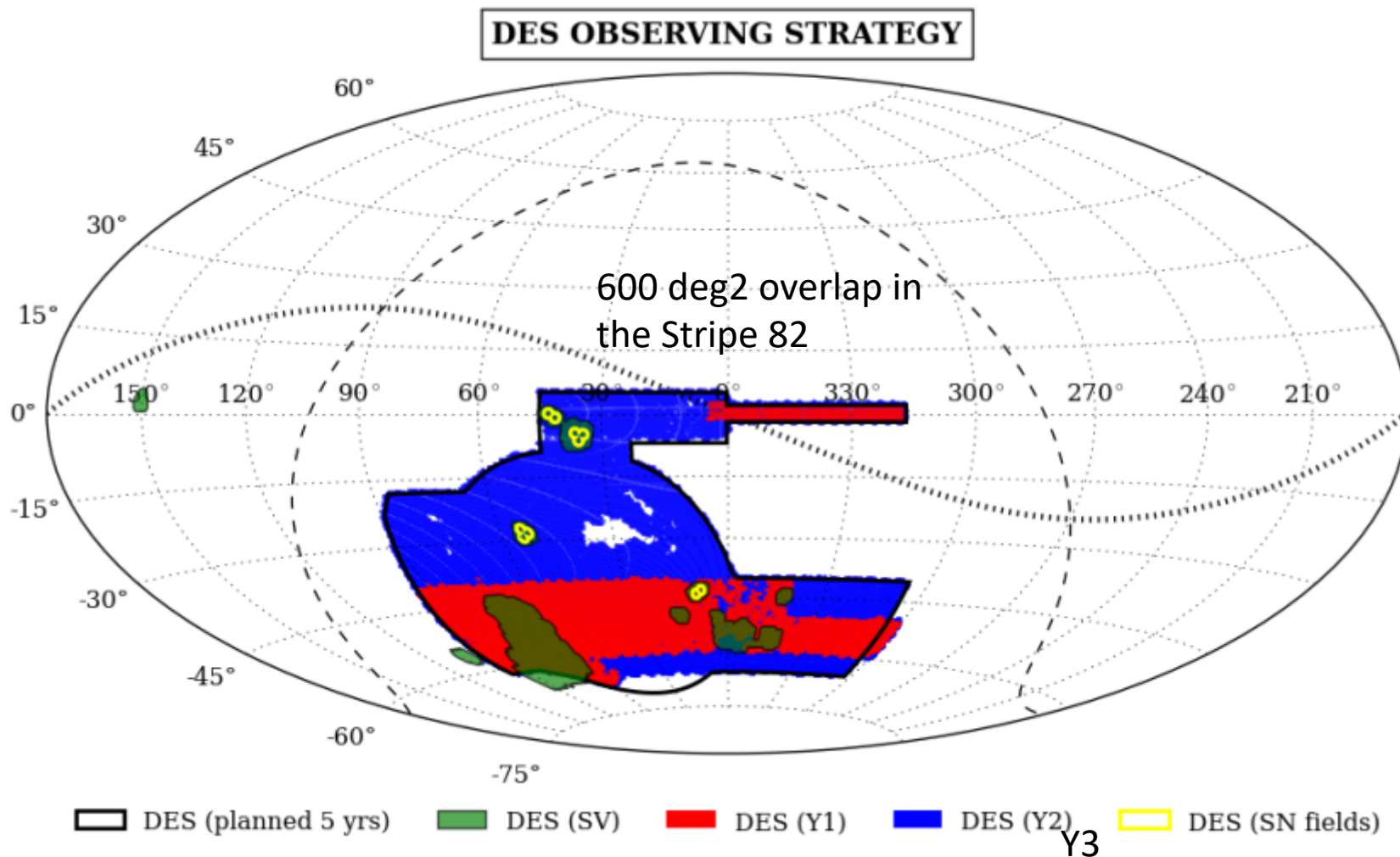
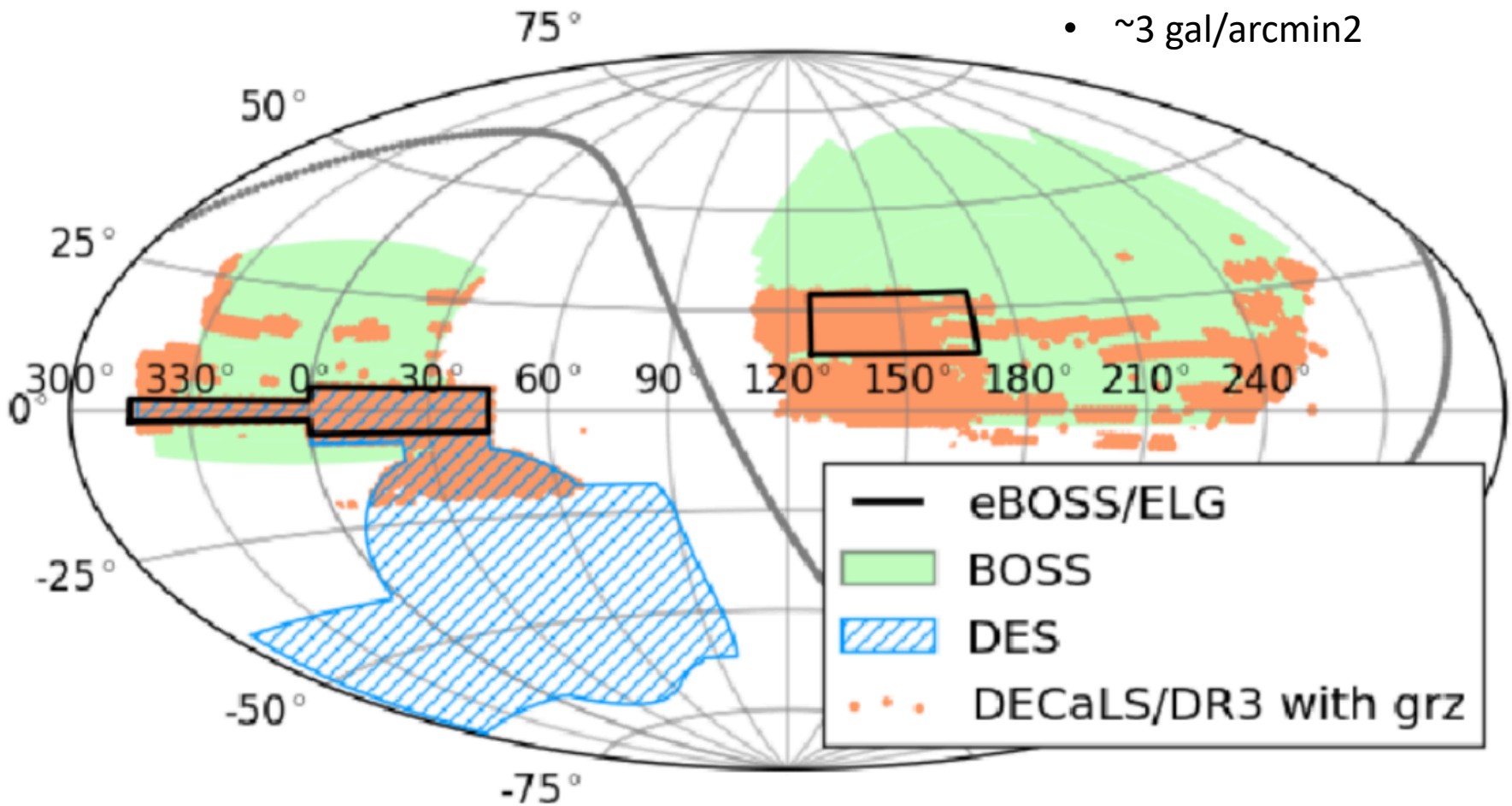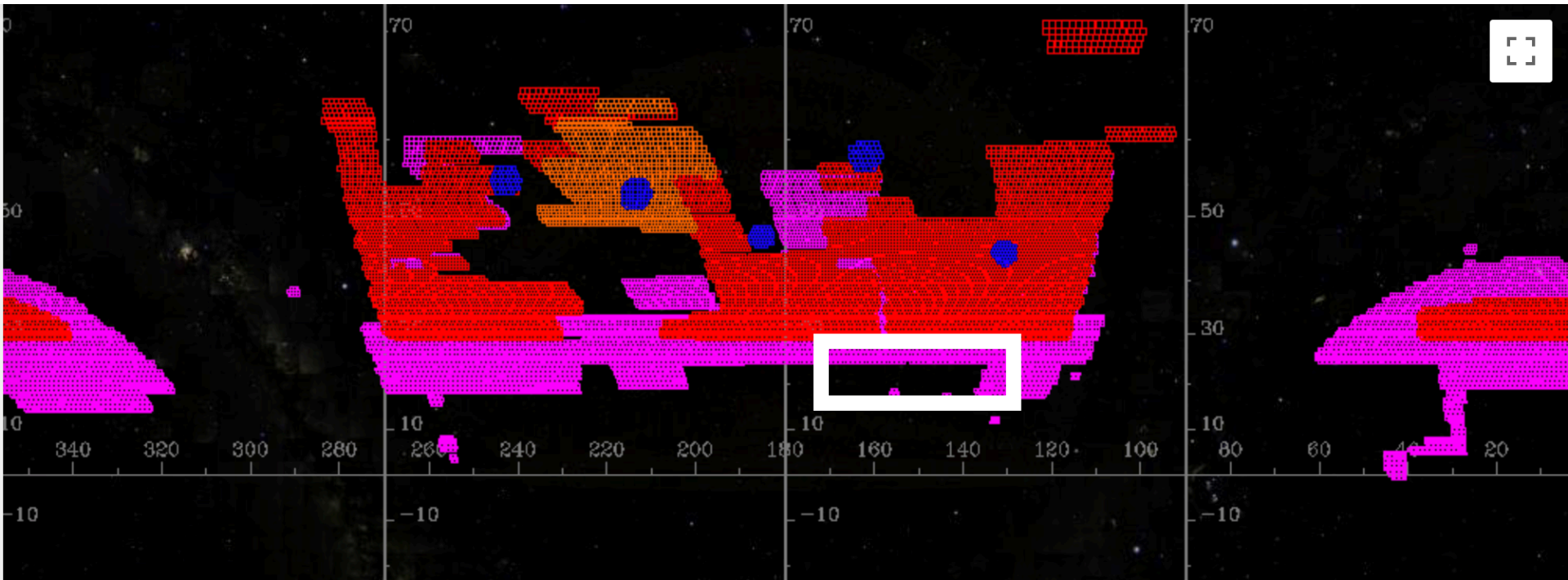# DECaLS WL?

=> Release DR8 end of May 2019

DECaLS/DR3 properties
- z_{med} = 0.5
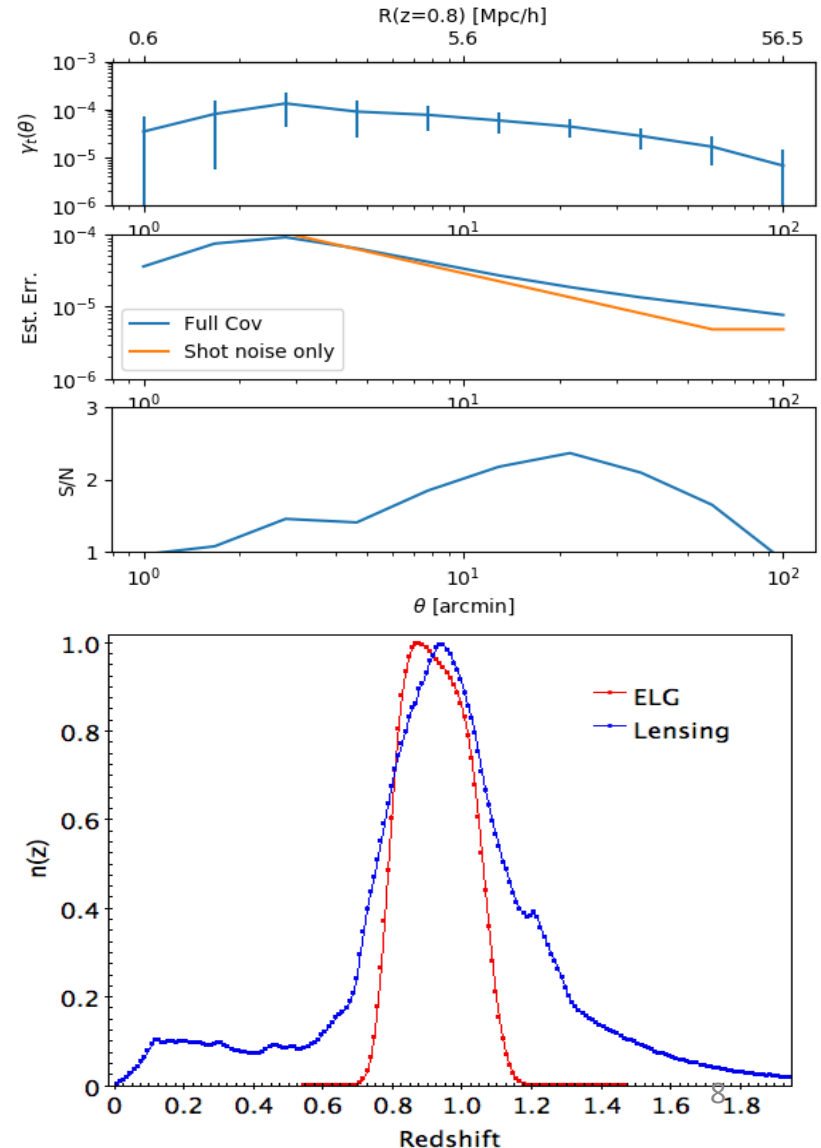- ~3 gal/arcmin2

UNIONS Status in May 2019

UNIONS DR1 sky coverage (Pan-STARRS griz = blue, CFIS-u = magenta, CFIS-r = red, CFISr&CFIS-r-LSB=orange)

➢ Weak-lensing catalogue calculation in progress
➢ Estimate of the n(z) in progress

eBOSS-ELG DES Forecast

COSMOSIS[1] to perform measurements forecast, with the following setting:

- 600 deg^2 of overlapping area

- 180 ELG.deg^{-2}, galaxy bias = 1.65

- 0.82 bkg gals.arcmin^{-2} for lensing

- n(z) for DES with photo-z cut (Bin 3, metacalibration, DES2017)

- Intrinsic alignment

- Linear model for $C_{gm}(l)$ and $Cov[C_{gm}](l,l')$

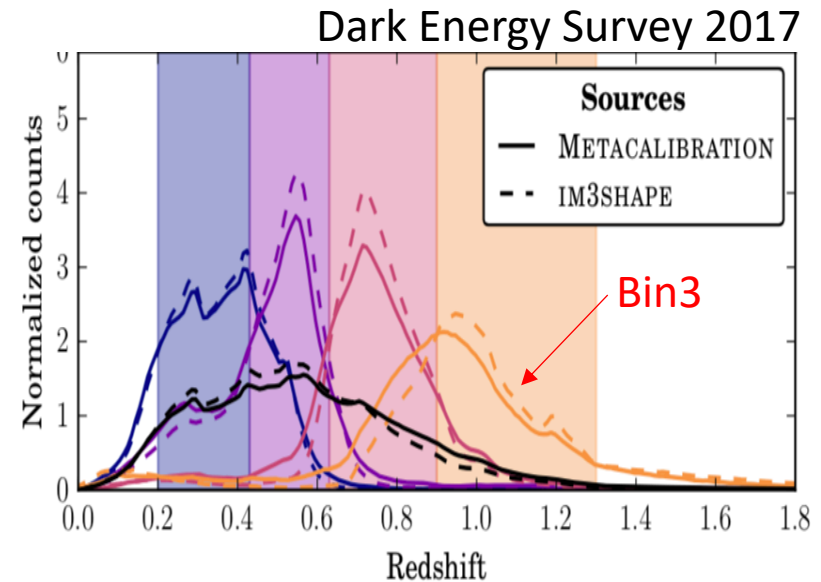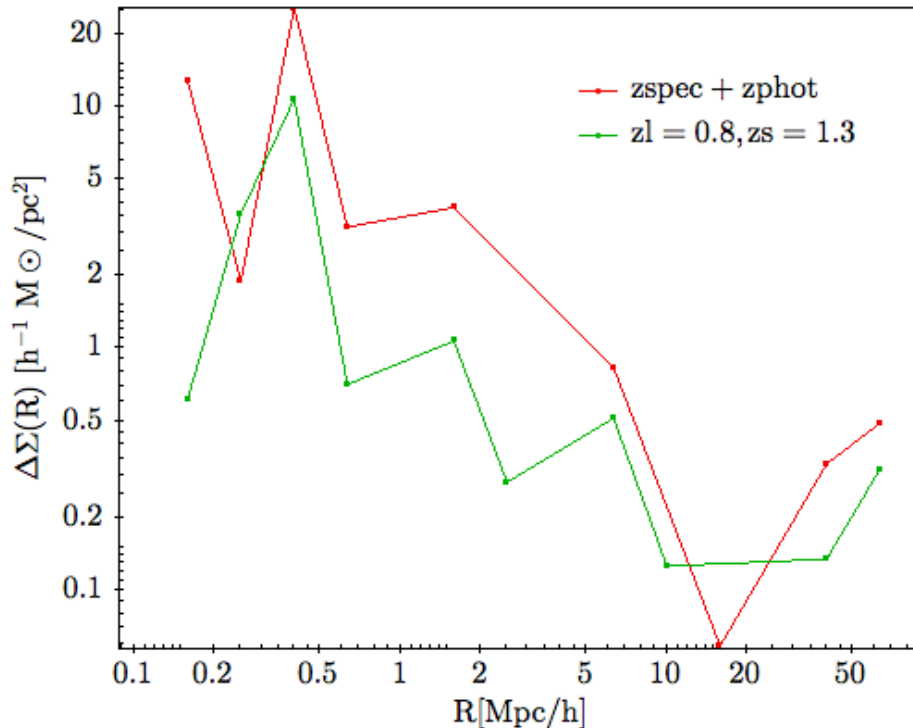   => We can improve this with simulations

- Planck cosmological parameters

[1] https://bitbucket.org/joezuntz/cosmosis

DESxELG measurements

First measurement to assess the S/N:

➢ Overlapping area 153 deg^2 on eboss21 region

➢ 29836 ELG and 131997 background sources (DES, Bin3, im3shape)

=> 195 ELG.deg^{-2} and 0.24 bkg gal.arcmin^{-2}

Improvement solutions

- Add more lensing data on wider area
  - eboss22 region, combine with CFHT-Stripe 82 (+85 deg^2)
  - NGC region, combine with DECaLS DR3/DR8

=> Bad zphot, need to find color-color selection to get z>0.6 sources

  - Request access to DES Y3 Fat-Stripe82 data

- Correlate lensing with LRG and CMASS samples

Next steps

- Add CS82, DECaLS lensing information

- Cross-correlated lensing with LRG and CMASS

- Estimate covariance matrices
  - Analytic prescription with COSMOSIS
  - Compare with Outerrim Hearing2015 mock catalogues
    - Use halo model to add lensing signal without ray-tracing through N-body particles (Giocoli et al. 2017)

- Add DES Y3 weak-lensing data

- Prepare Shear catalogue for DR8

- Estimate zphot for DR8?

Comparison DES vs CS82

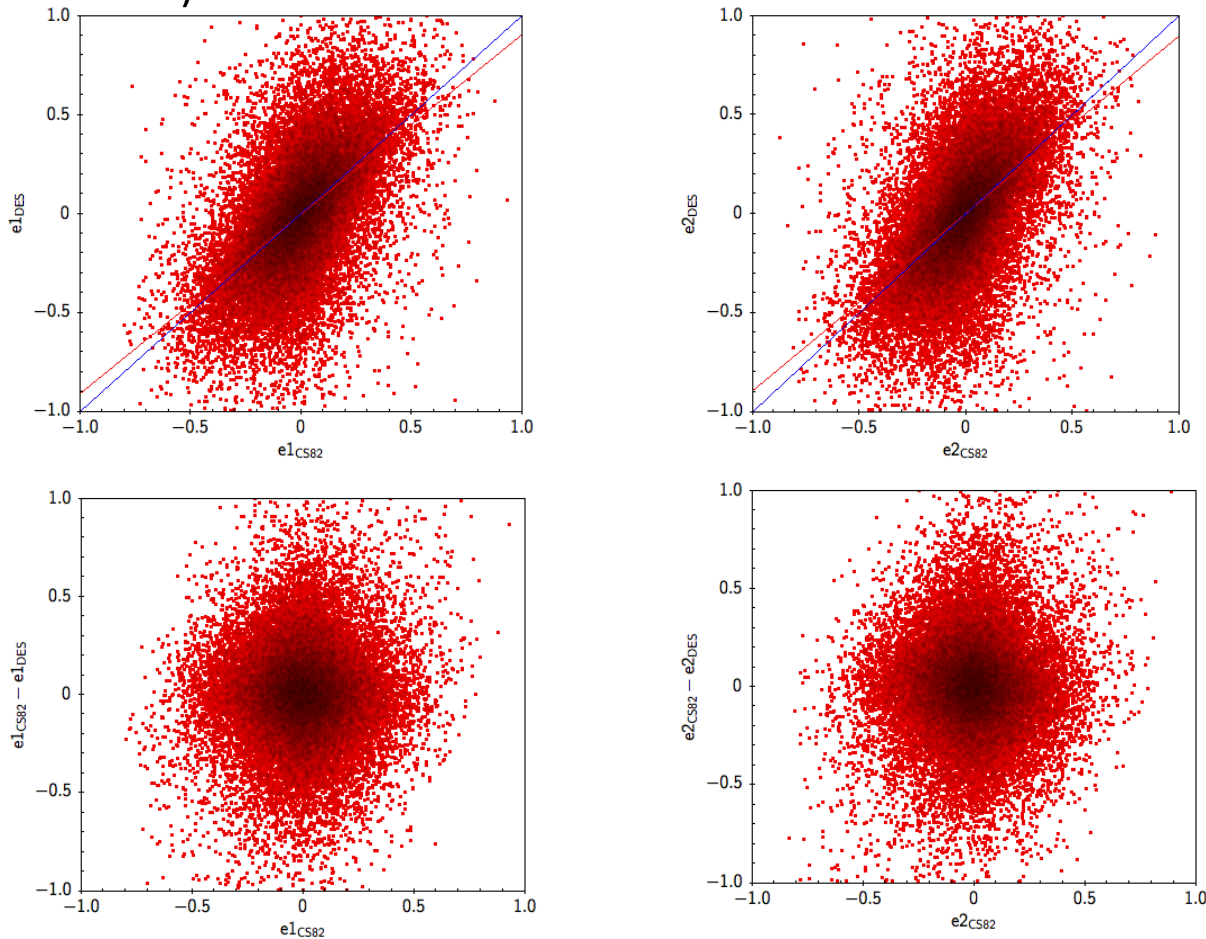Comparison between *DES-im3shape* and *CFHT-CS82* catalogues (Jullo et al. 2019)
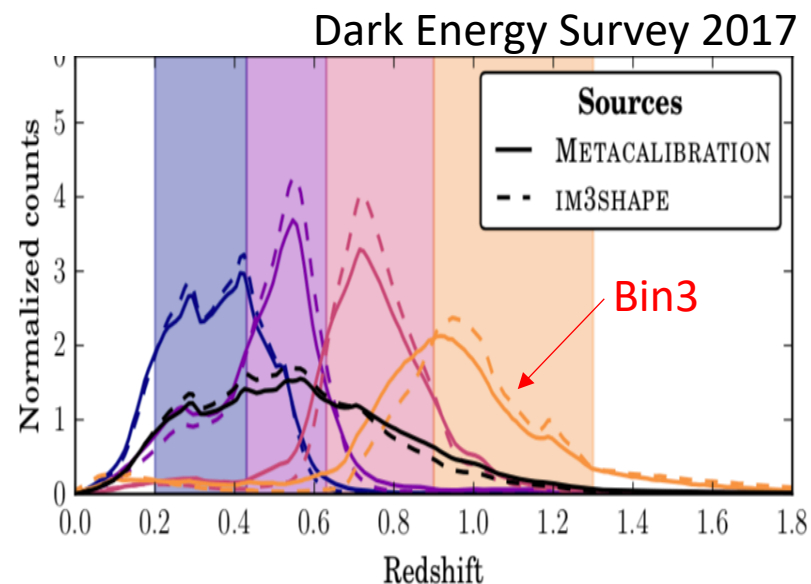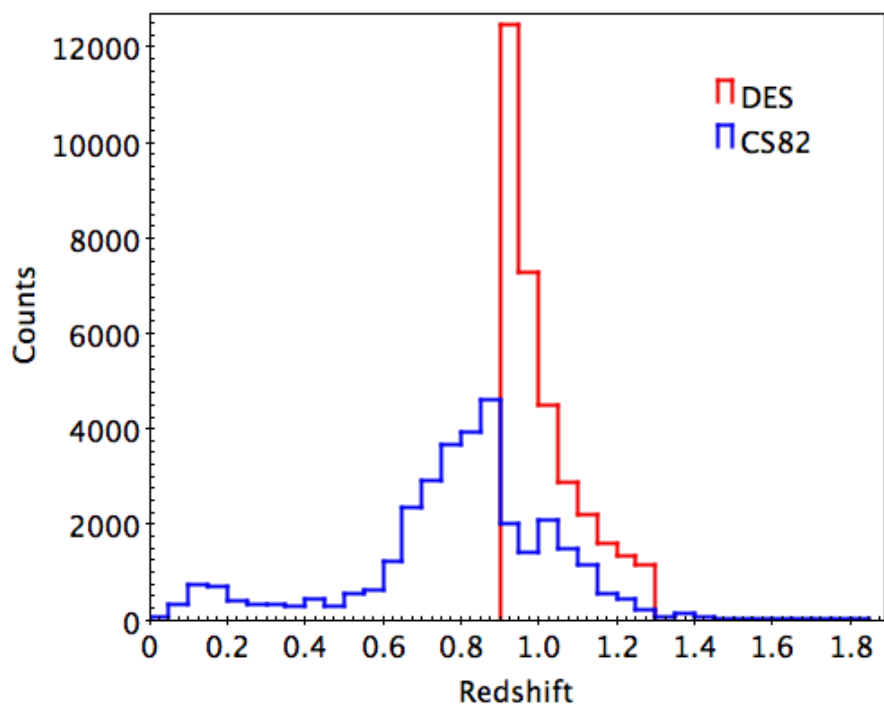
DES Bin3
Selection in photometric redshift 0.9 < z < 1.3

=> The CS82 n(z) reproduces the DES n(z) at z<0.90

Comparison DES vs CS82

Comparison between *DES-im3shape* and *CFHT-CS82* catalogues (Leauthaud et al. 2016, Jullo et al. 2019)

=> Large scatter between measurements but no systematic bias

Comparison DES vs DECaLS/DR3

Comparison between *DES-im3shape* and *DECaLS/DR3* catalogues (Shan et al. 2017, Phriksee et al. submitted)