# Effects of angular anisotropies on the cosmic shear covariance

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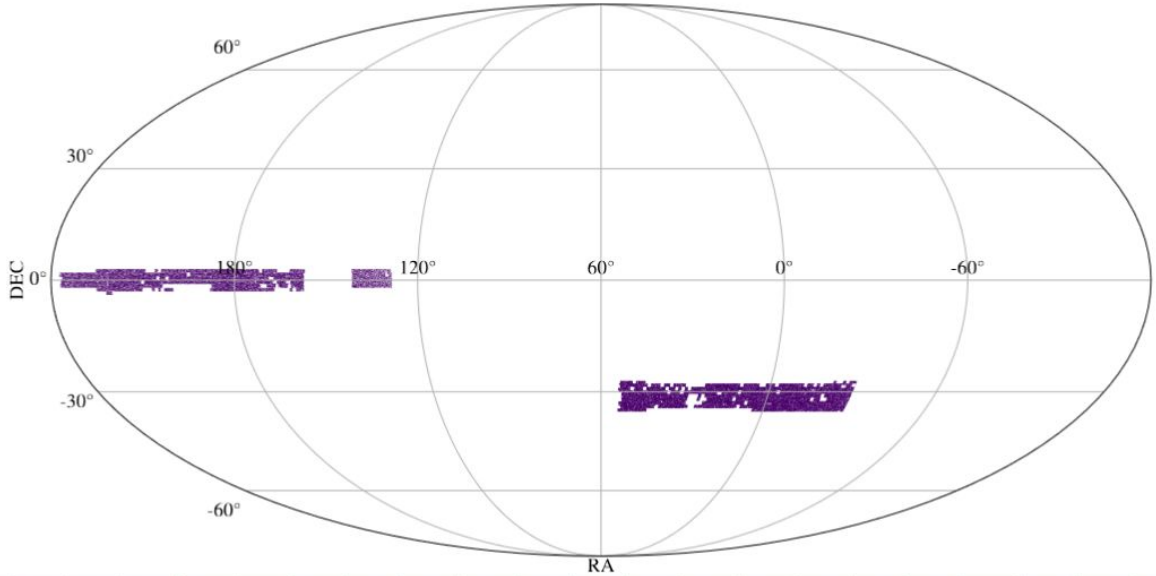
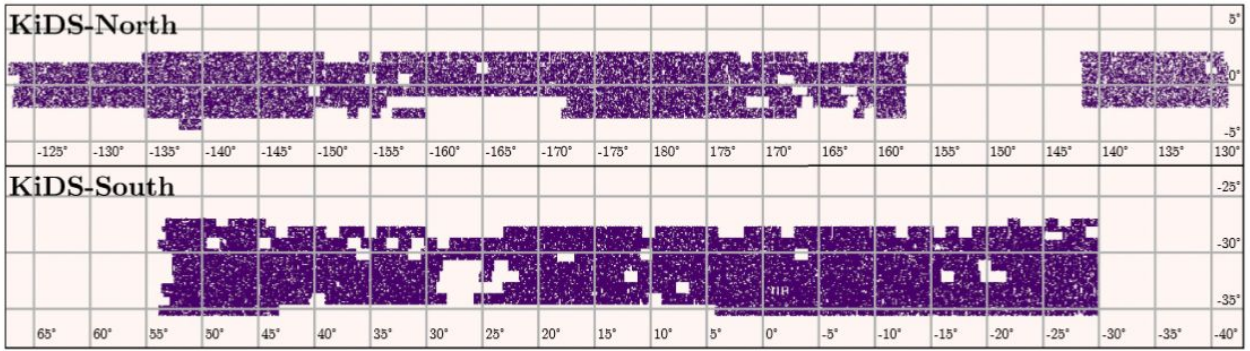
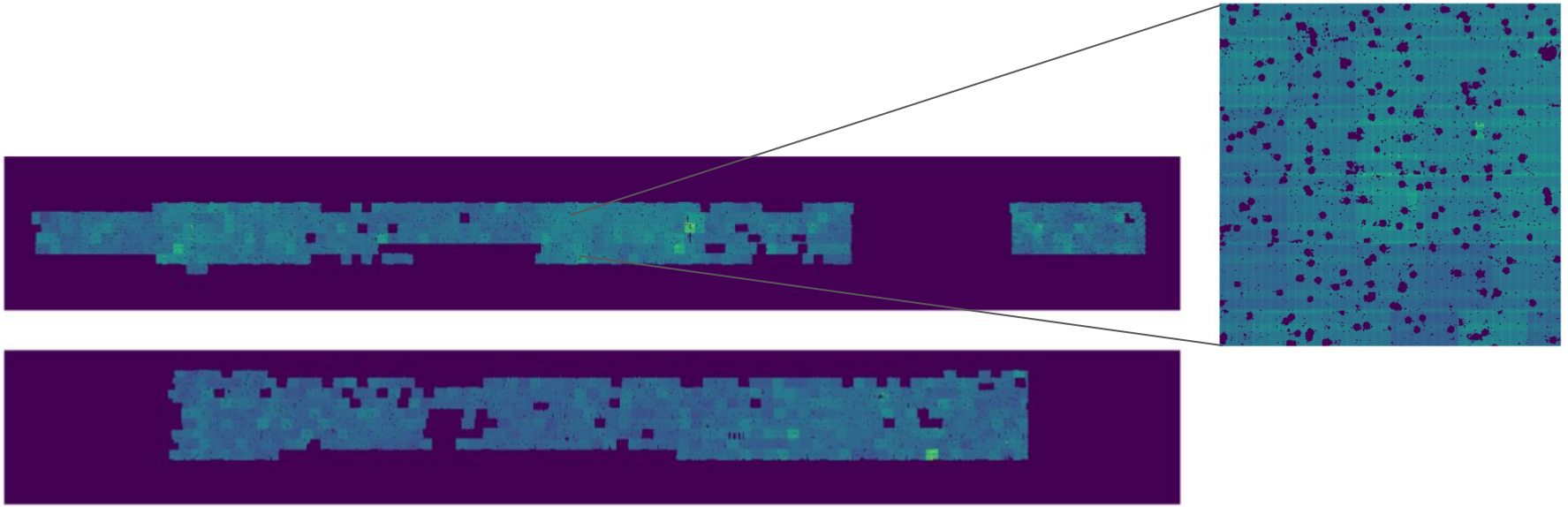
Euclid IST:NL - 20/10/2023

# Kilo-Degree Survey: KiDS-1000



# Variable observational depth

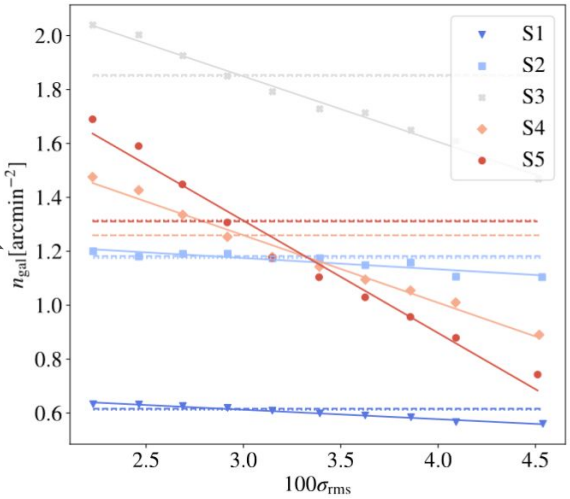



Root-mean-square of the background noise
$\propto$ depth$^{-1}$

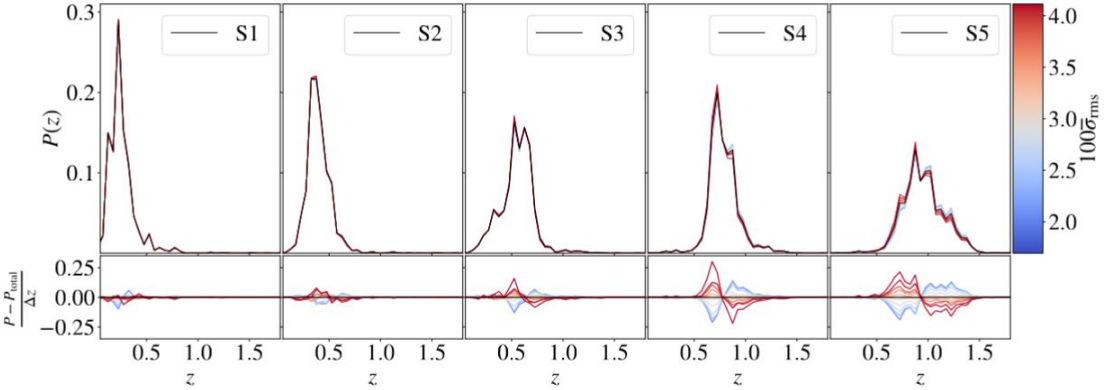
# Variable observational depth

With increasing depth, …

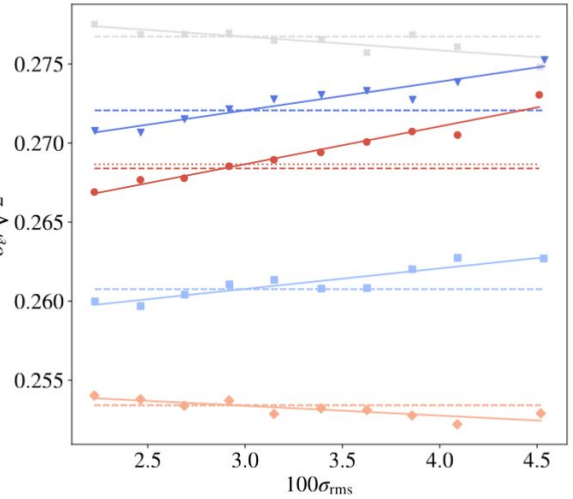
**1.** Galaxy density increases.




**2.** The mean of the redshift distribution increases.




**3.** Intrinsic galaxy shape dispersion varies.



# Numerical covariance

Simulations:

- Lognormal-random galaxy fields (using GLASS)
- Galaxy position and shape sampling according to survey characteristics
- 5,000 realisations at a fixed cosmology per variation

Variations:

1. **Buceros**: 777.4 deg$^2$ square footprint — w/o variable depth
2. **Cygnus**: 777.4 deg$^2$ realistic KiDS-1000 footprint — w/o variable depth
3. **Egretta**: 777.4 deg$^2$ realistic KiDS-1000 footprint — w/ variable depth



+ Realism

# Analytical covariance

Based on Joachimi et al. (2021):

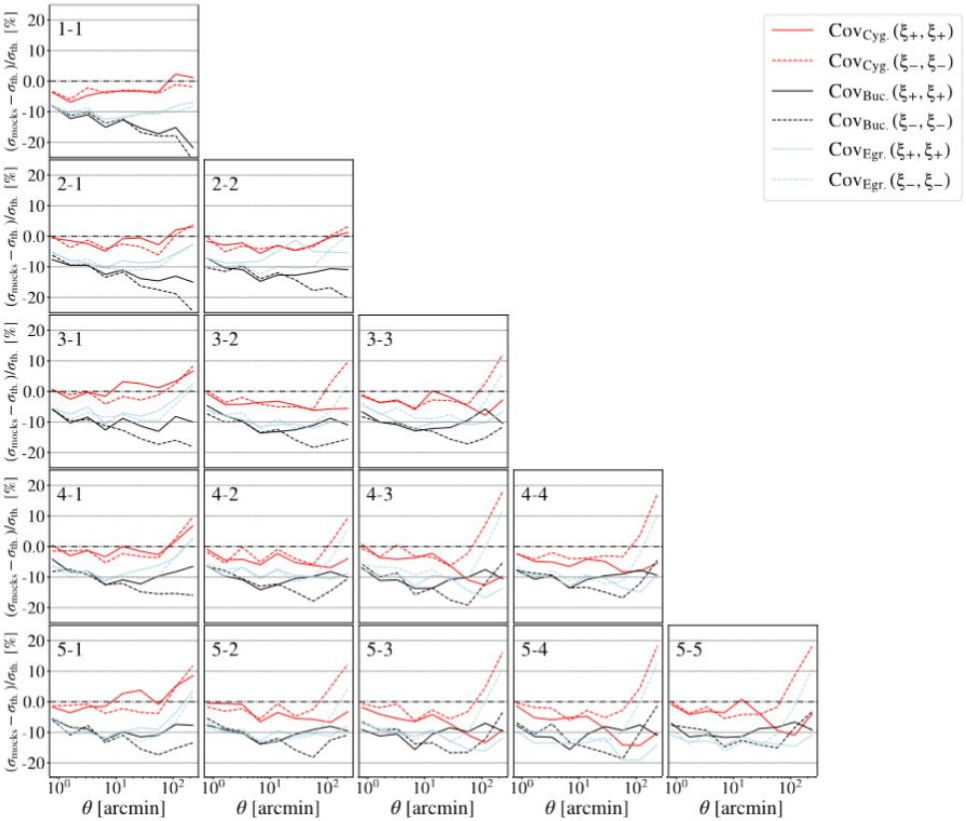
Consider realistic KiDS-1000 footprint

$$\mathrm{Cov}(\hat{\xi}_{\pm}, \hat{\xi}'_{\pm}) = \mathrm{Cov}_{\mathrm{SN}} + \mathrm{Cov}_{\mathrm{mixed}} + \mathrm{Cov}_{\mathrm{SVA}} + \mathrm{Cov}_{\mathrm{NG}} + \mathrm{Cov}_{\mathrm{SSC}}$$

Only consider survey area

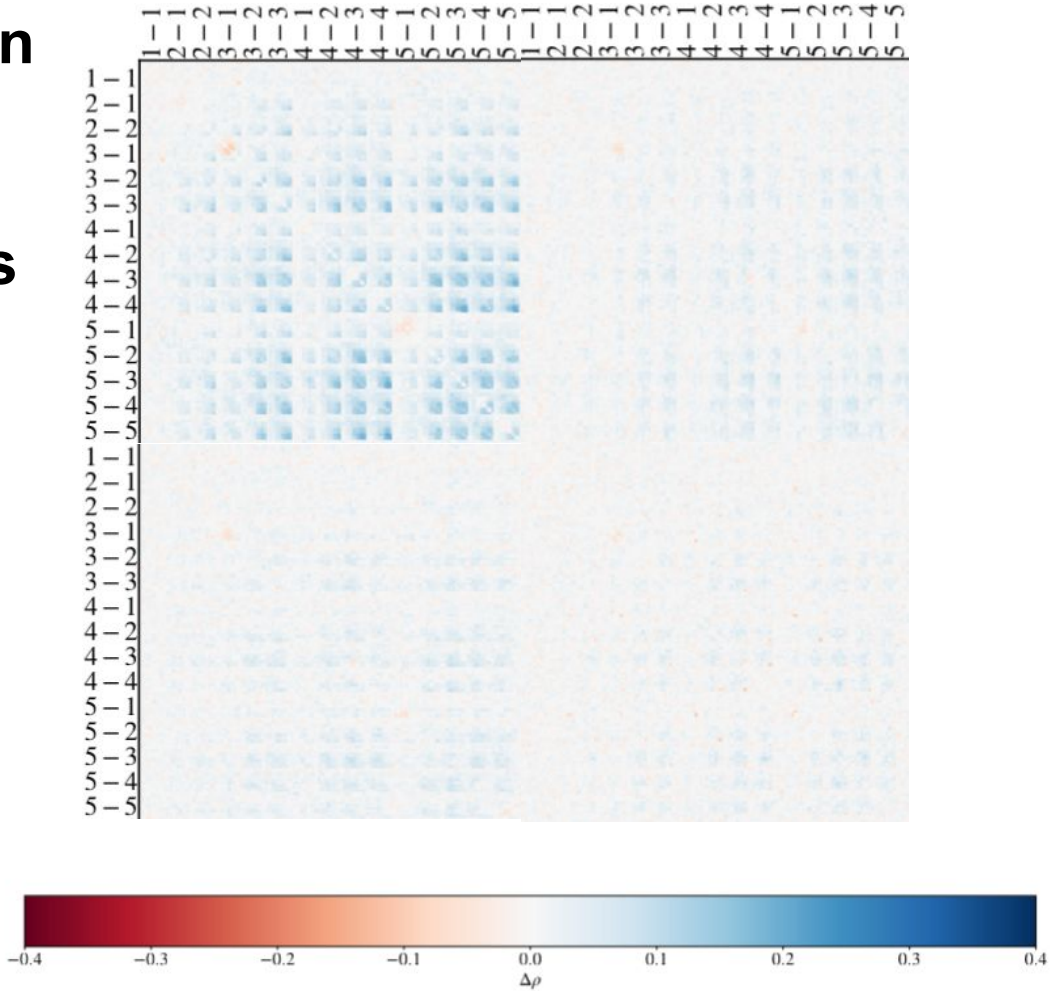
Consistent with the OneCovariance code.

# Comparison in the diagonals



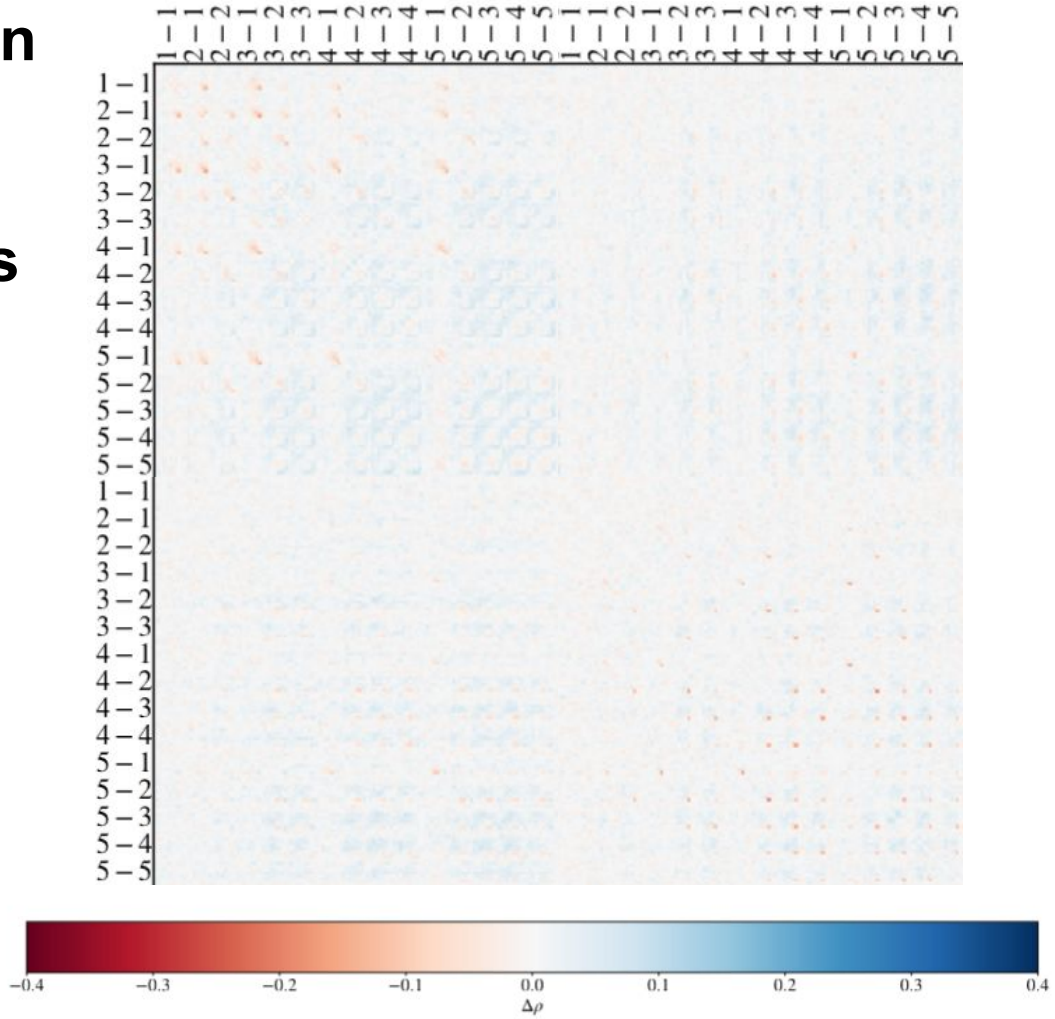
# Comparison of the correlation coefficients

Analytical
vs.
Cygnus



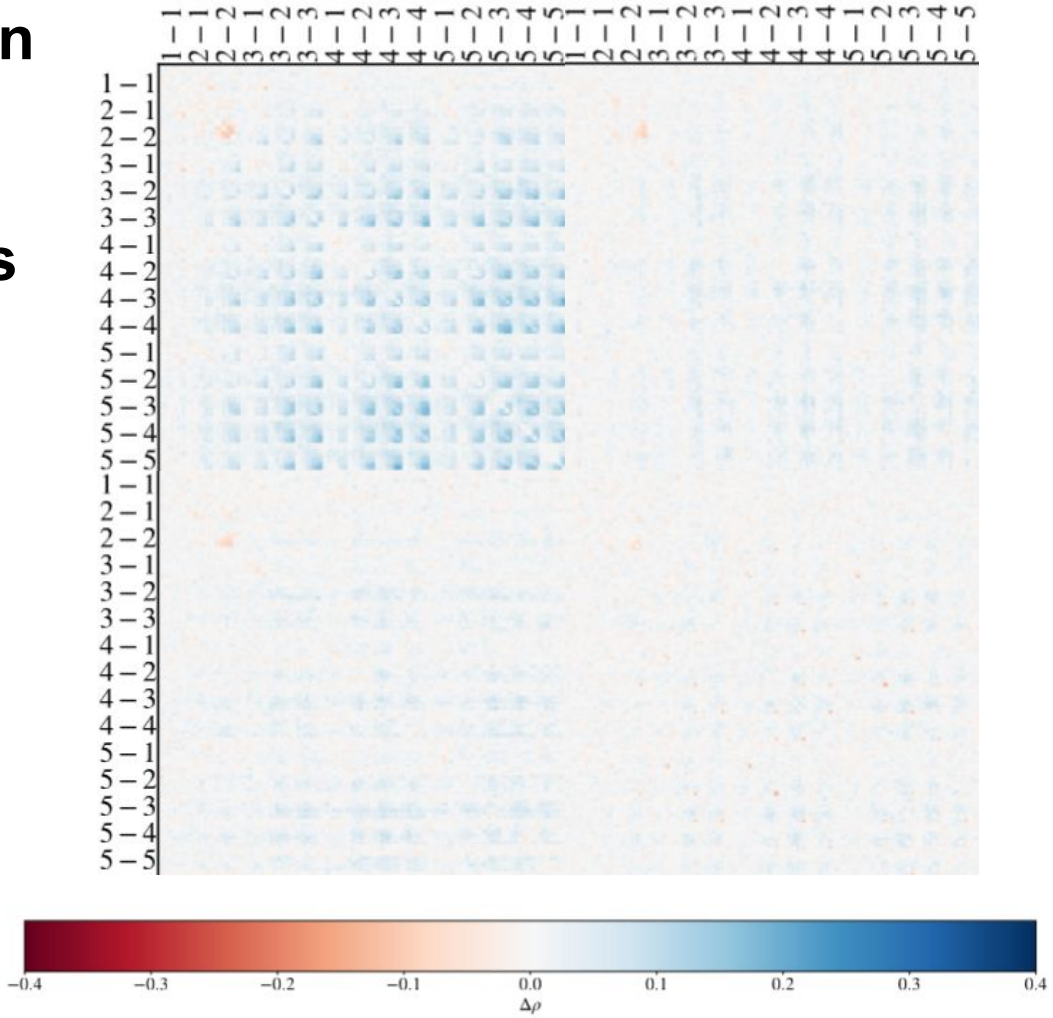
# Comparison of the correlation coefficients

Analytical
vs.
Buceros



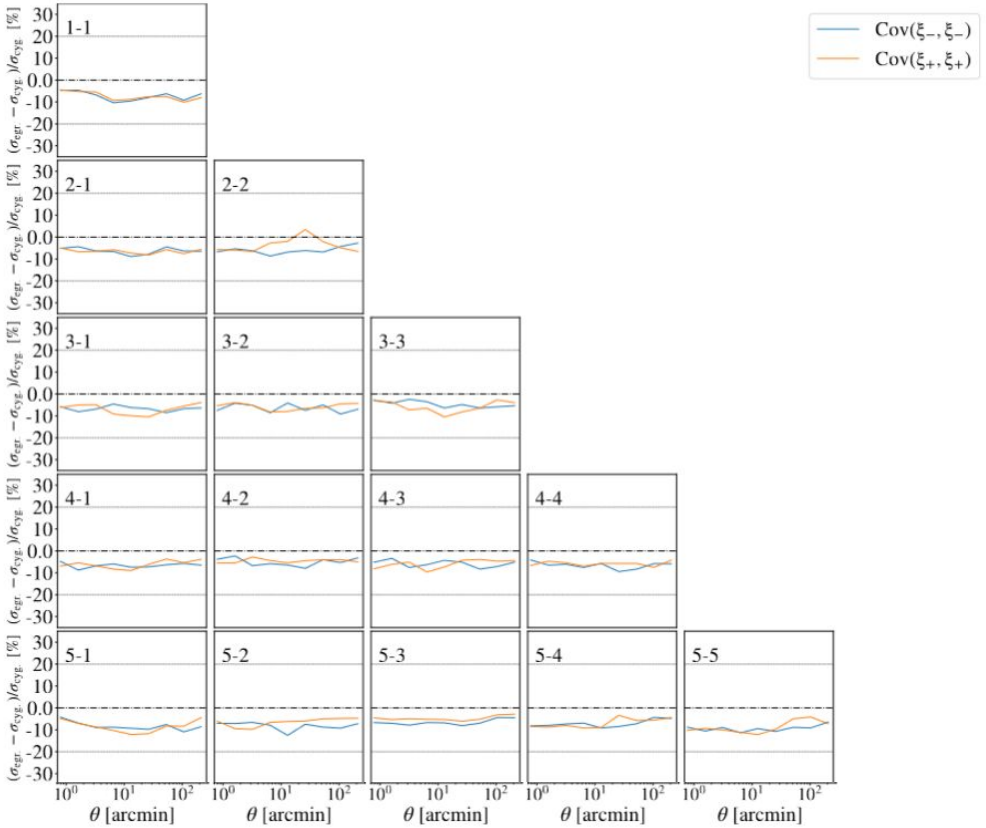
# Comparison of the correlation coefficients

Analytical
vs.
Egretta



# Comparison in the diagonals

Cygnus
vs.
Egretta



# Effect of V.D. on shape noise in KiDS-1000