Cosmic Shear Analysis choices

Quantifying the impact of and interplay between different analysis choices for LSST-Y1 in cosmic shear

Naomi Robertson, Institute for Astronomy, University of Edinburgh

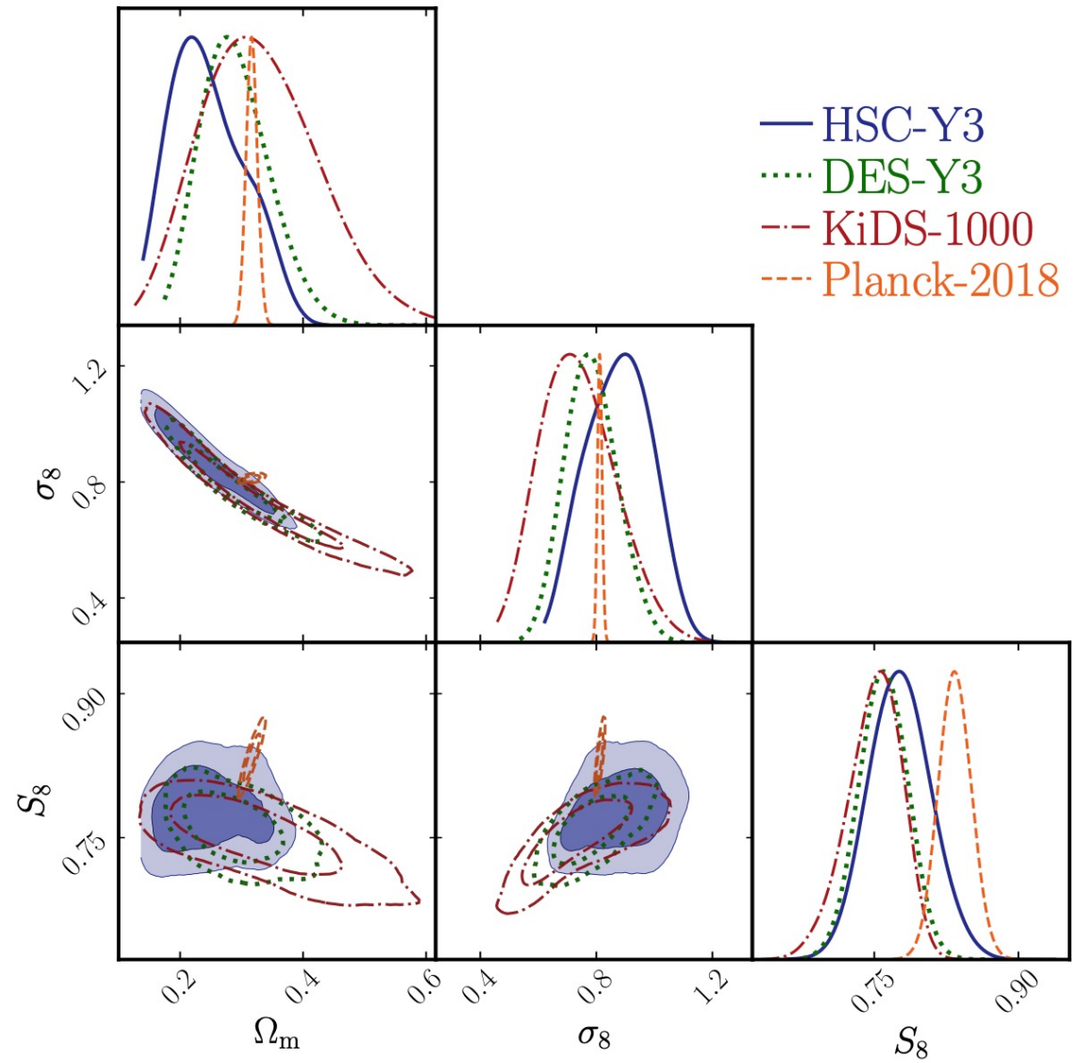
Current Status of Cosmic Shear

- Cosmic shear is the correlation between galaxy shapes due to gravitational lensing

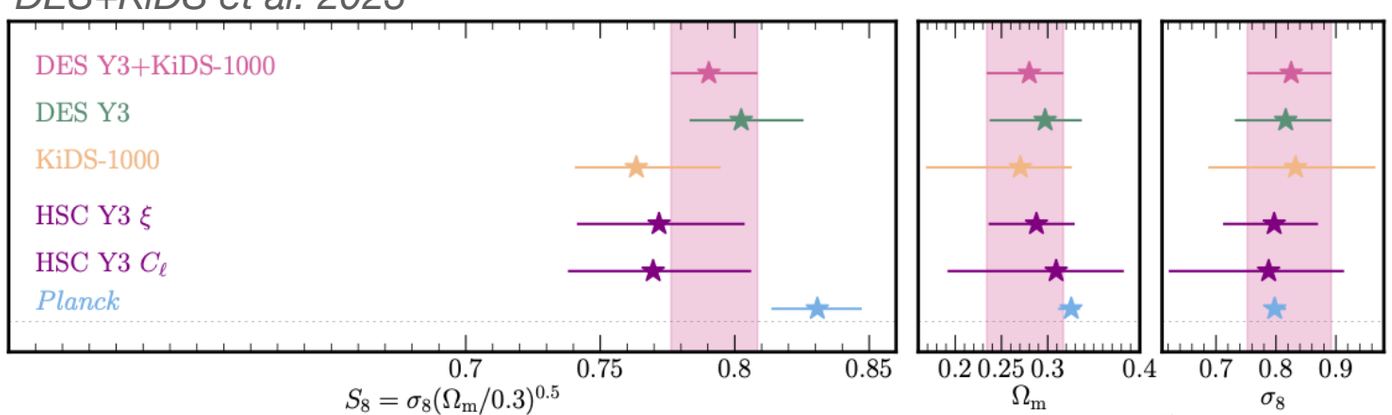
- Consistent results between current lensing surveys

- Some ‘tension’ with CMB in S8

Dalal et al. 2023



DES+KiDS et al. 2023

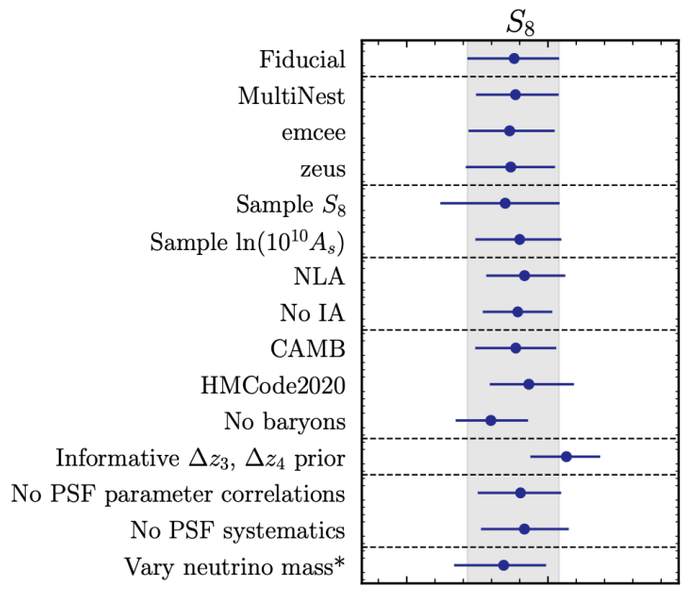


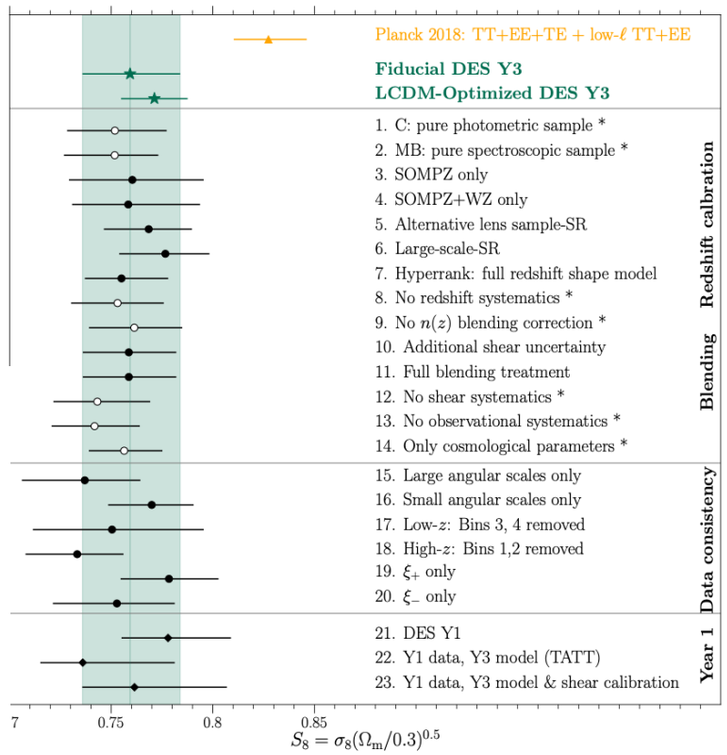
Cosmic Shear Analysis Choices

- Cosmic shear analysis is a many step process

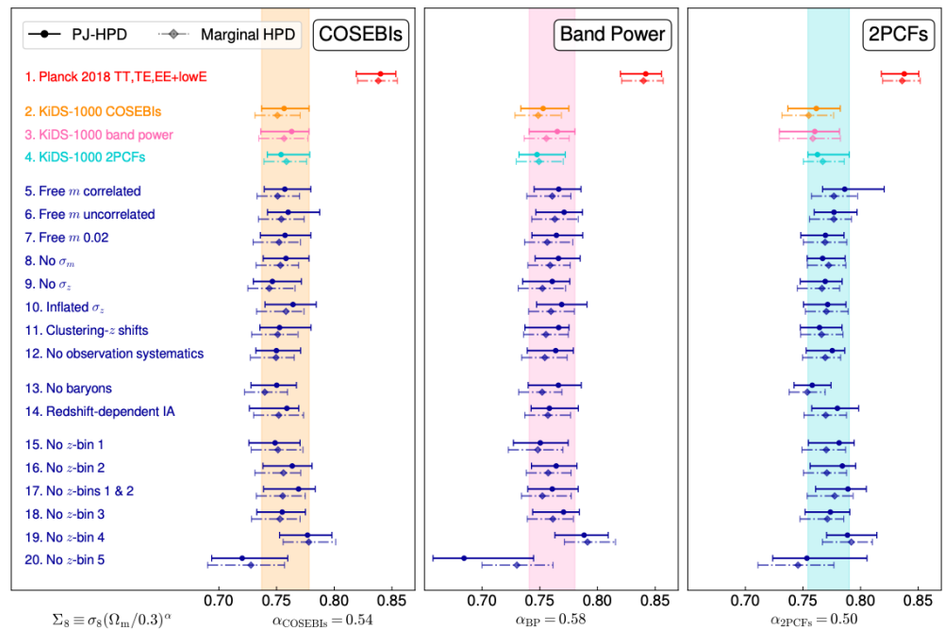
- Several systematics including astrophysical systematics

HSC Y3
Dalal et al. 2023





DES Y3
Amon et al. 2022



KiDS-1000
Asgari et al. 2020

Cosmic Shear Analysis Choices

- 2-point statistic
- Cosmological parameter choices
- IA model
- Baryon feedback mitigation
- Photo-z uncertainty marginalisation
- Priors on astrophysical parameters
- Priors on cosmological parameters
- Sampler
- Statistic to report

Goals for this project:

- 2-point statistic
- Cosmological parameter choices
- IA model
- Baryon feedback mitigation
- Photo-z uncertainty marginalisation
- Priors on astrophysical parameters
- Priors on cosmological parameters
- Sampler
- Statistic to report

- Which systematics dominate in the default case?
- What are the requirements on the priors not to be systematics limited?
- Which systematics mimic one another and how does this bias constraints?
- Be able to make recommendations for modelling choices in LSST-Y1
- Validate aspects of the DESC modelling pipelines

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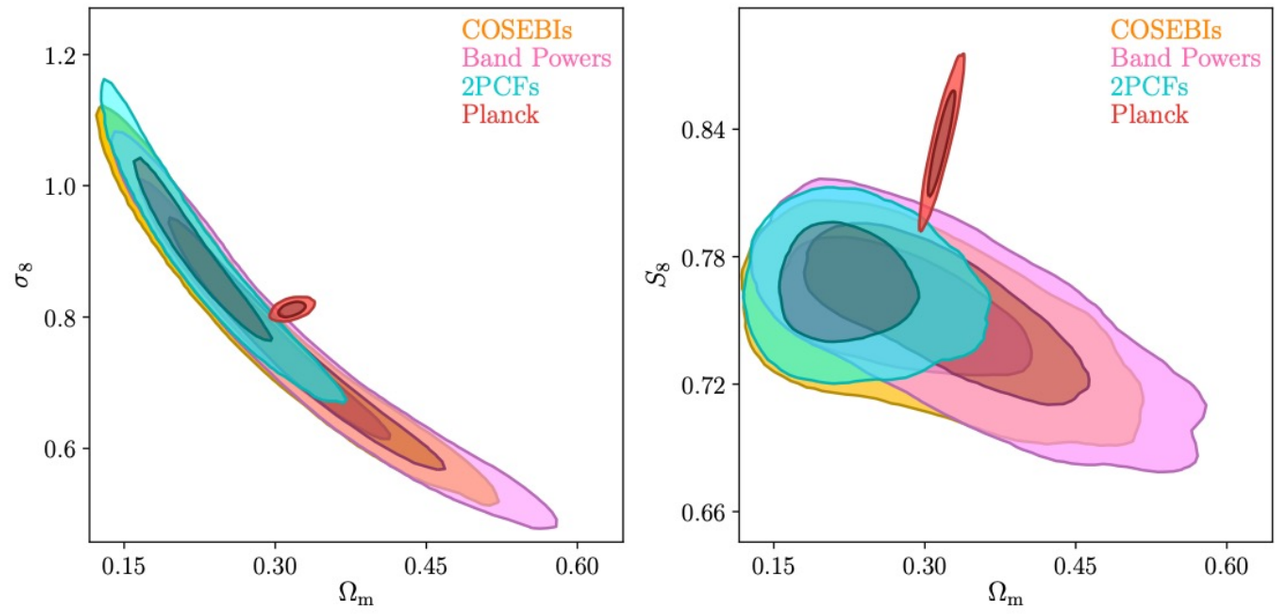

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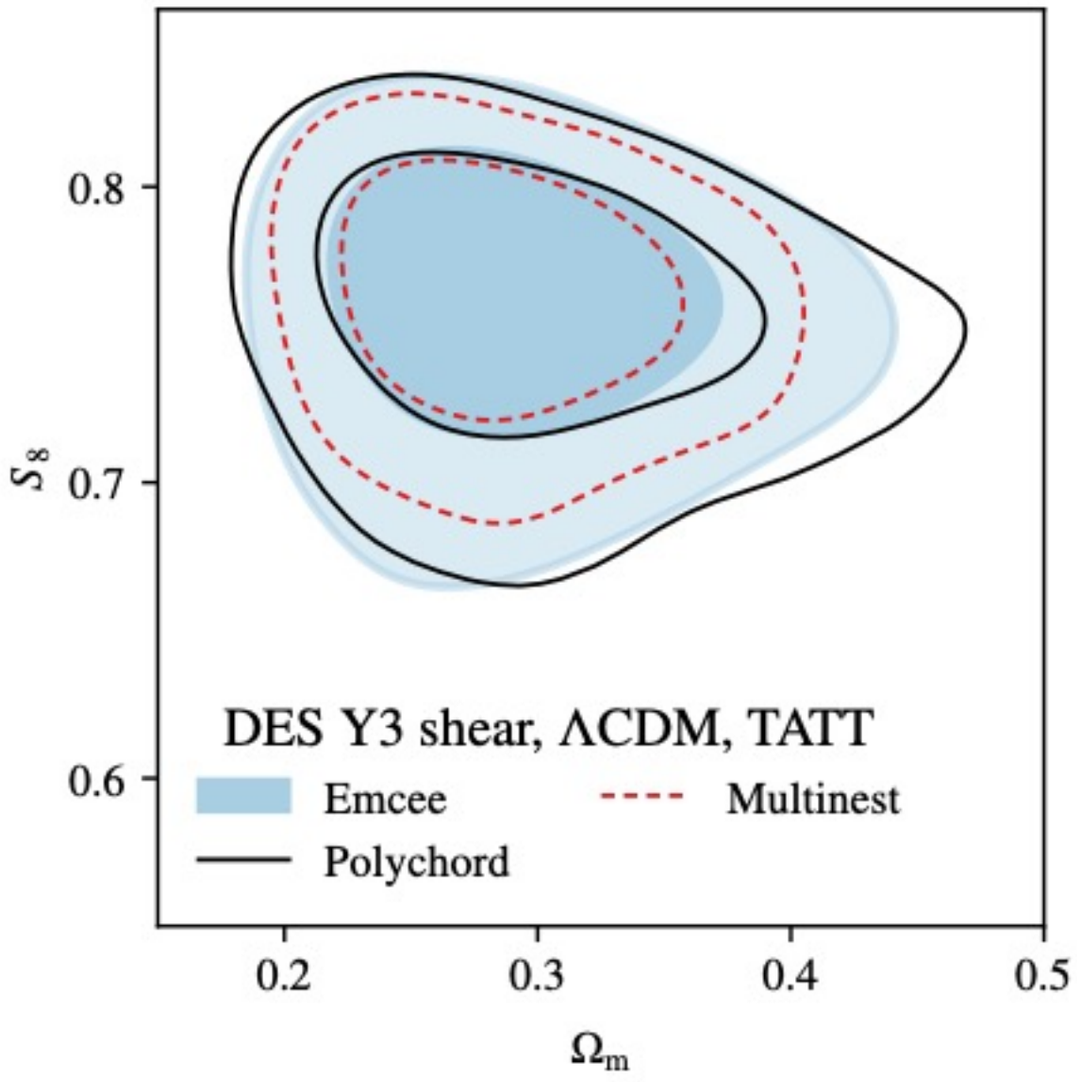


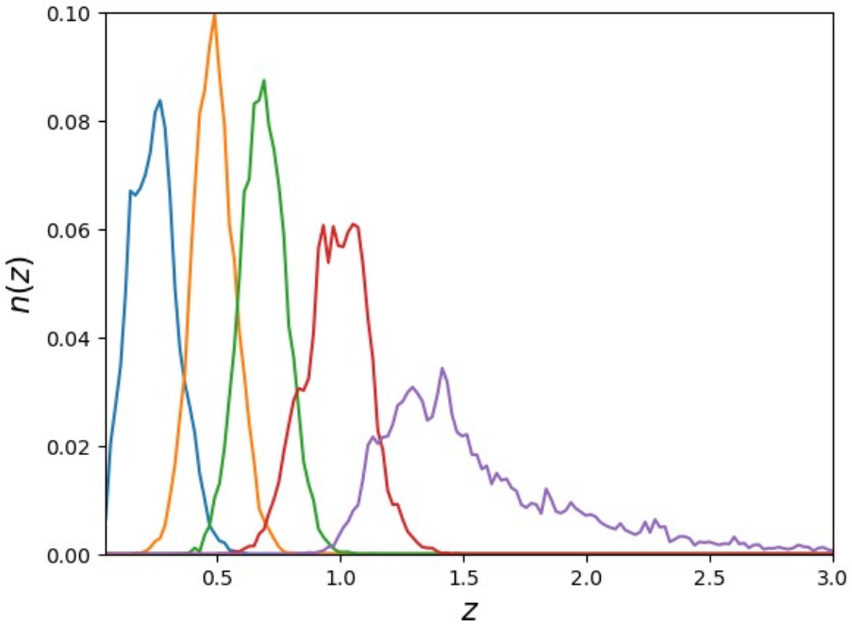
Mock Analysis

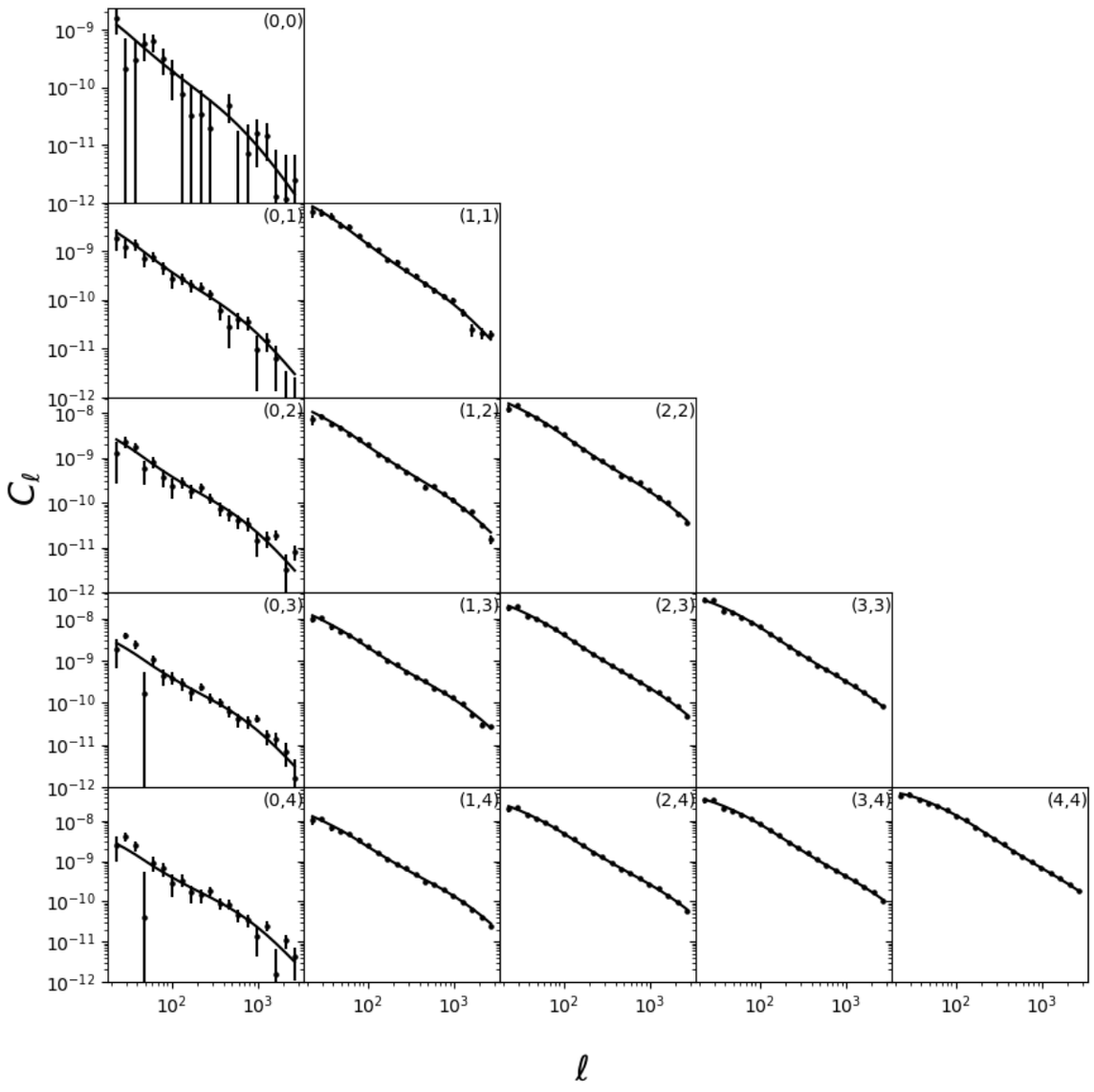
- We consider two mock cosmic shear data vectors:
  - SRD

$$n_{\rm eff}[\mathrm{arcmin}^{-2}] = 9.52 \;\; \Delta z = 0.006(1+z) \;\; \sigma_e = 0.26$$

  - HSC Y3 like

$$n_{\rm eff}[\mathrm{arcmin}^{-2}] = 13.96 \;\; \Delta z = 0.015(1+z) \;\; \sigma_e = 0.26$$





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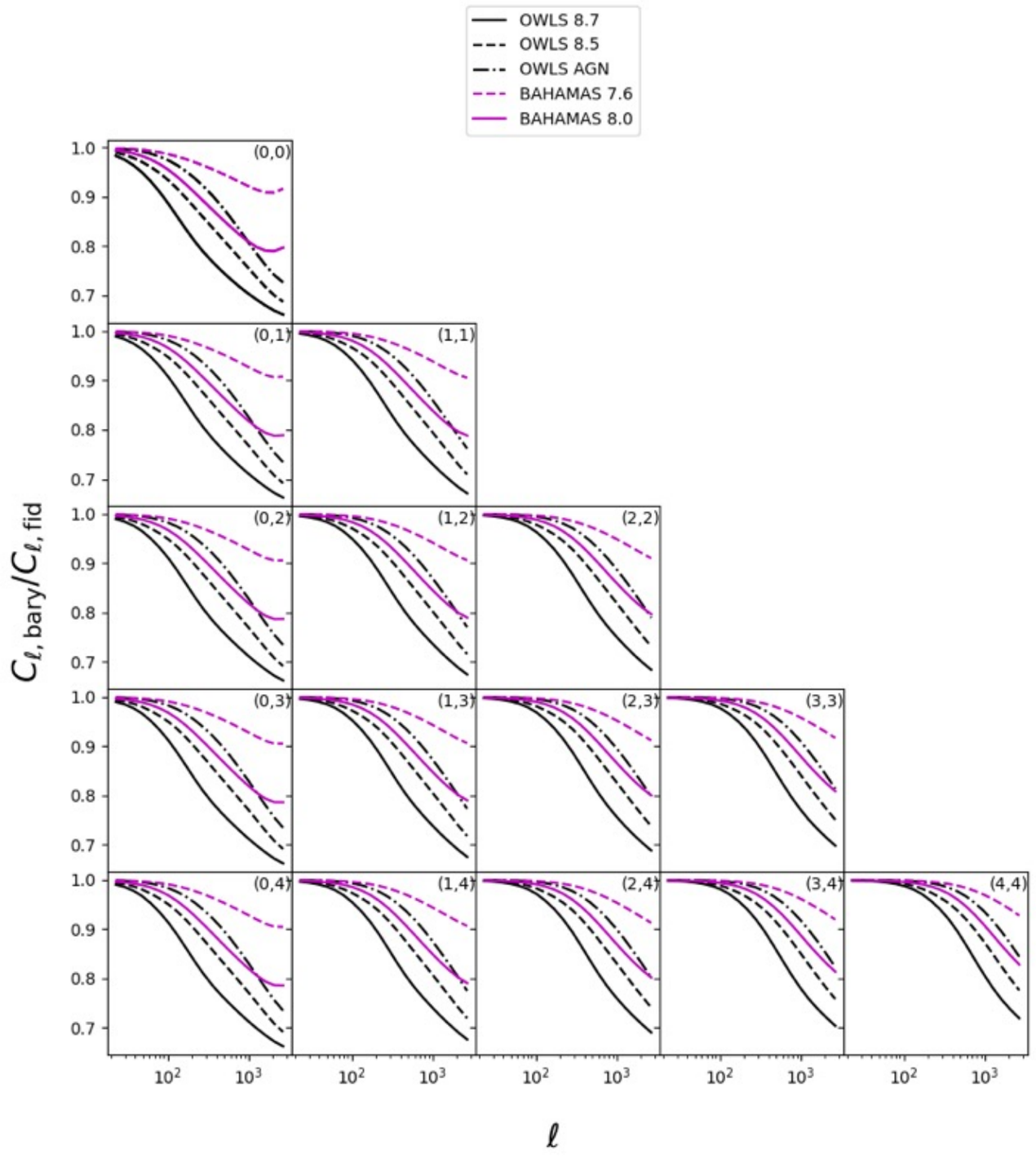

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