

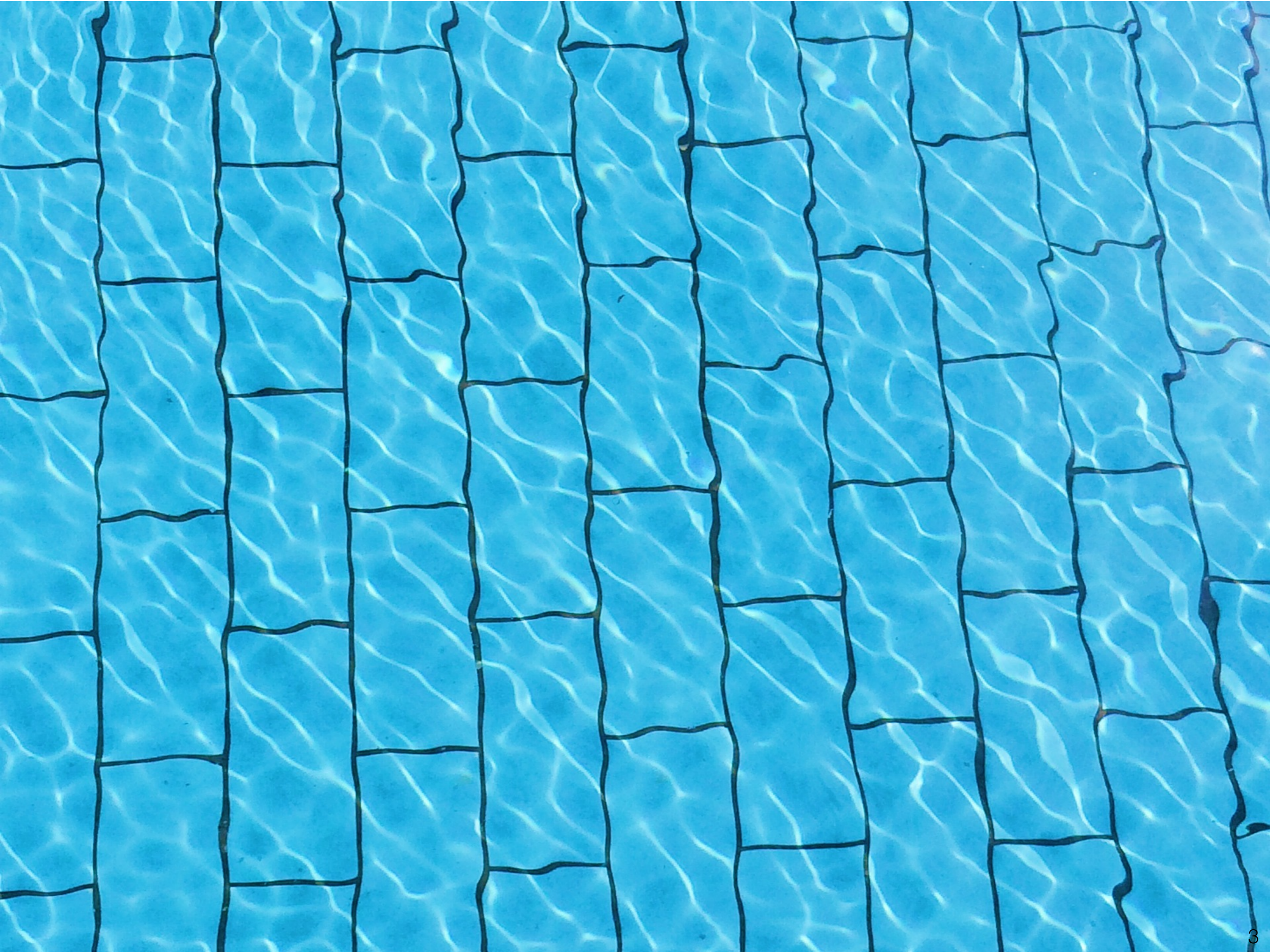
A joint analysis of KiDS-1000 gravitational lensing and the tSZ effect

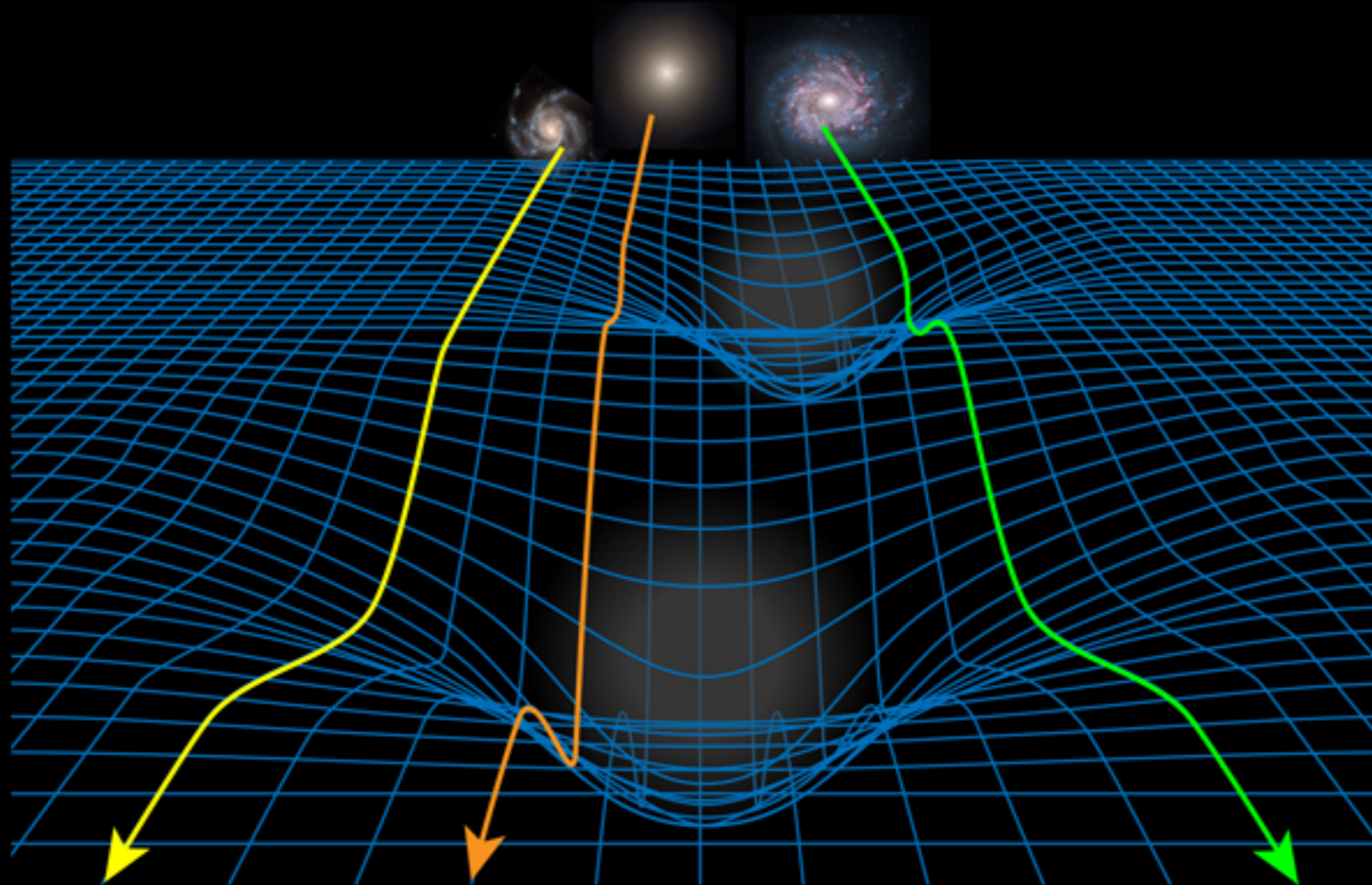
Tilman Tröster

Cosmology from Home 2022

[arXiv:2109.04458](https://arxiv.org/abs/2109.04458)

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gravitational lensing and the tSZ effect

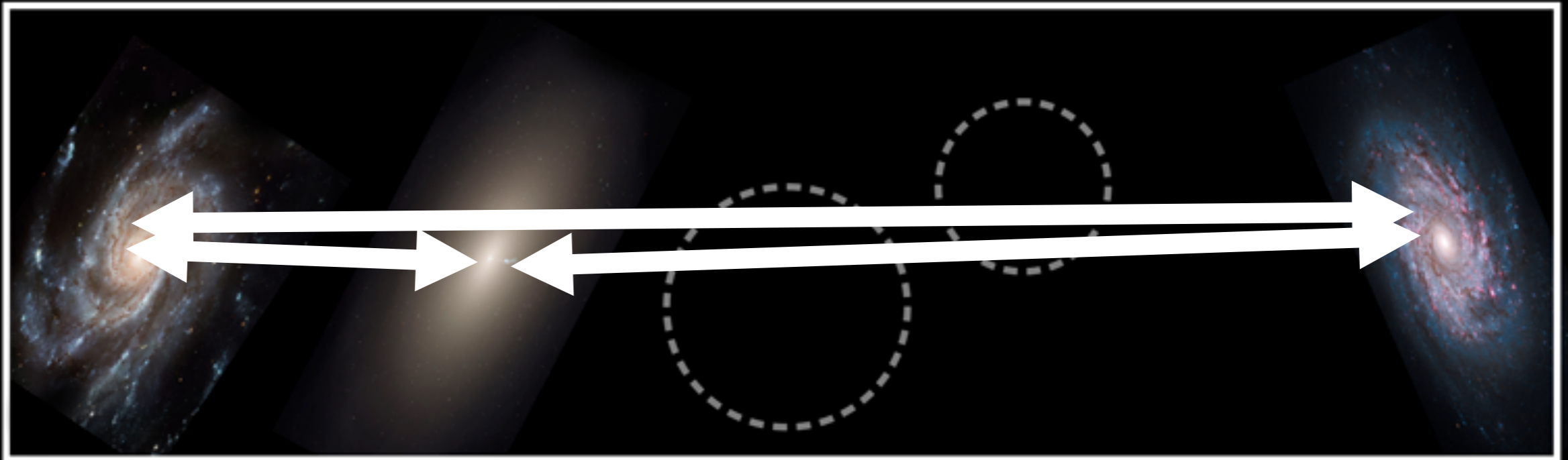
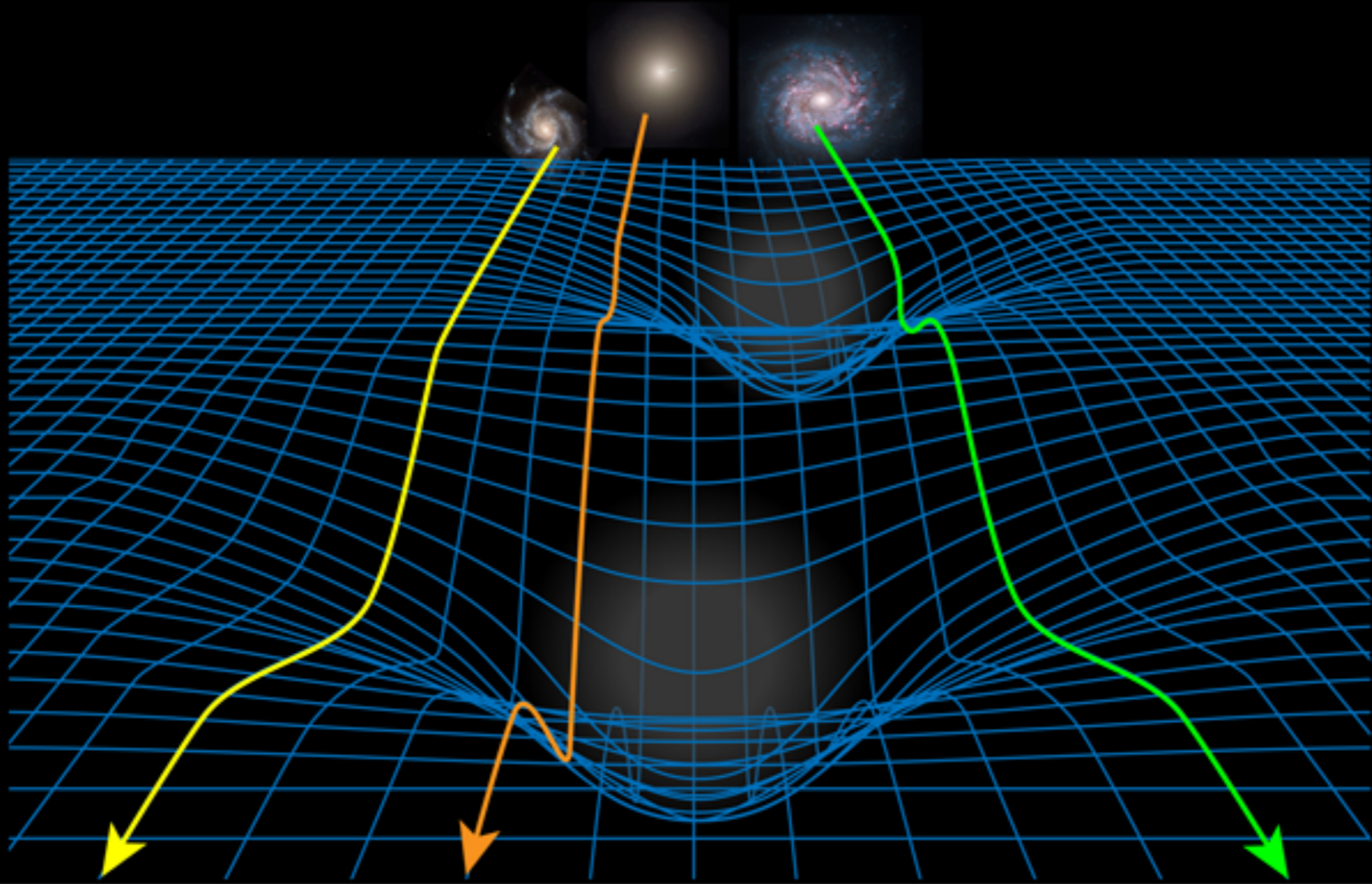




APS/Alan Stonebraker; galaxy images from STScI/AURA, NASA, ESA, and the Hubble Heritage Team

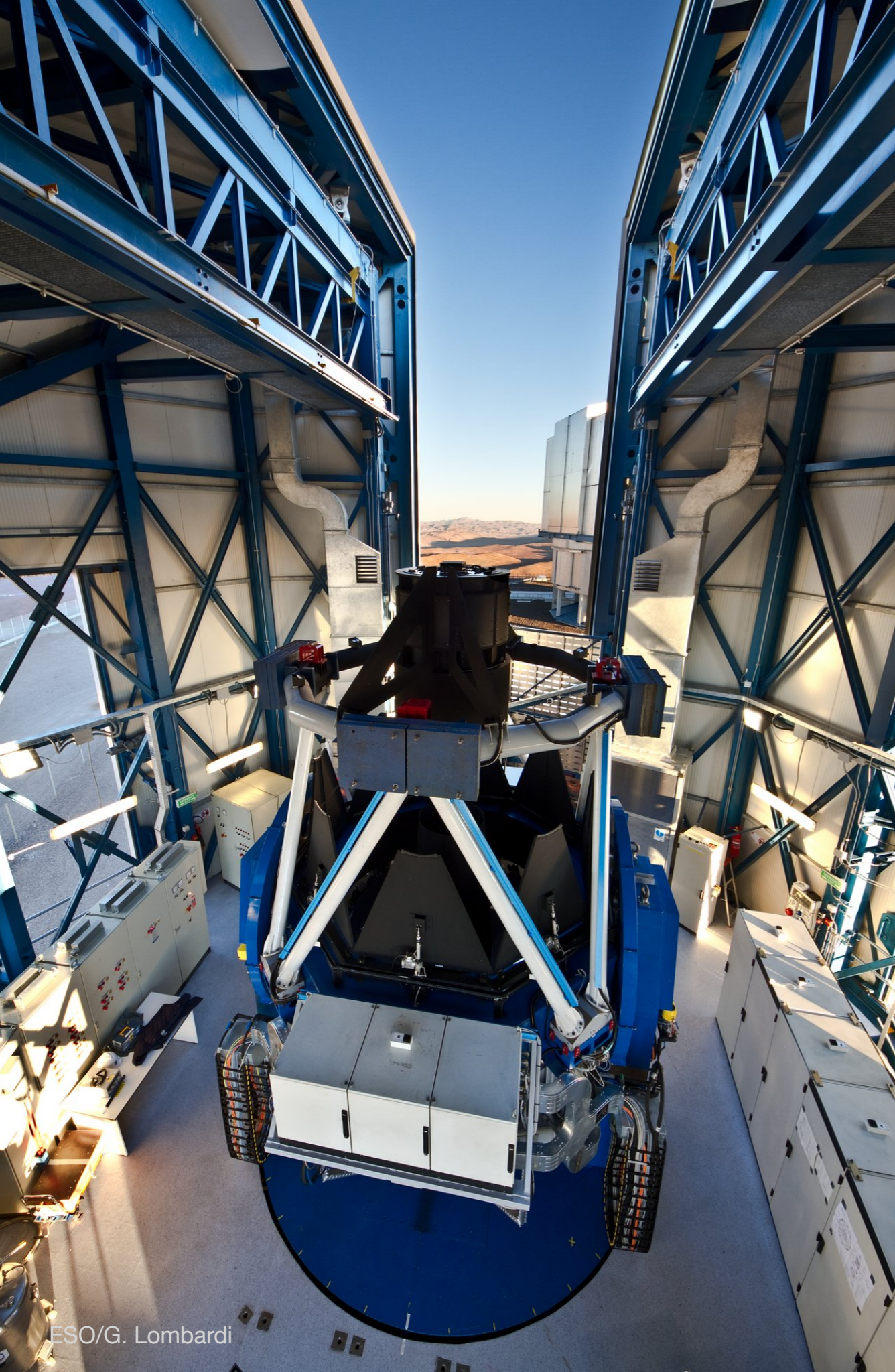
Cosmic shear

- correlation between galaxy shapes
- probes the distribution of **all** matter



APS/Alan Stonebraker; galaxy images from STSci/AURA, NASA, ESA, and the Hubble Heritage Team

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Kilo-Degree Survey

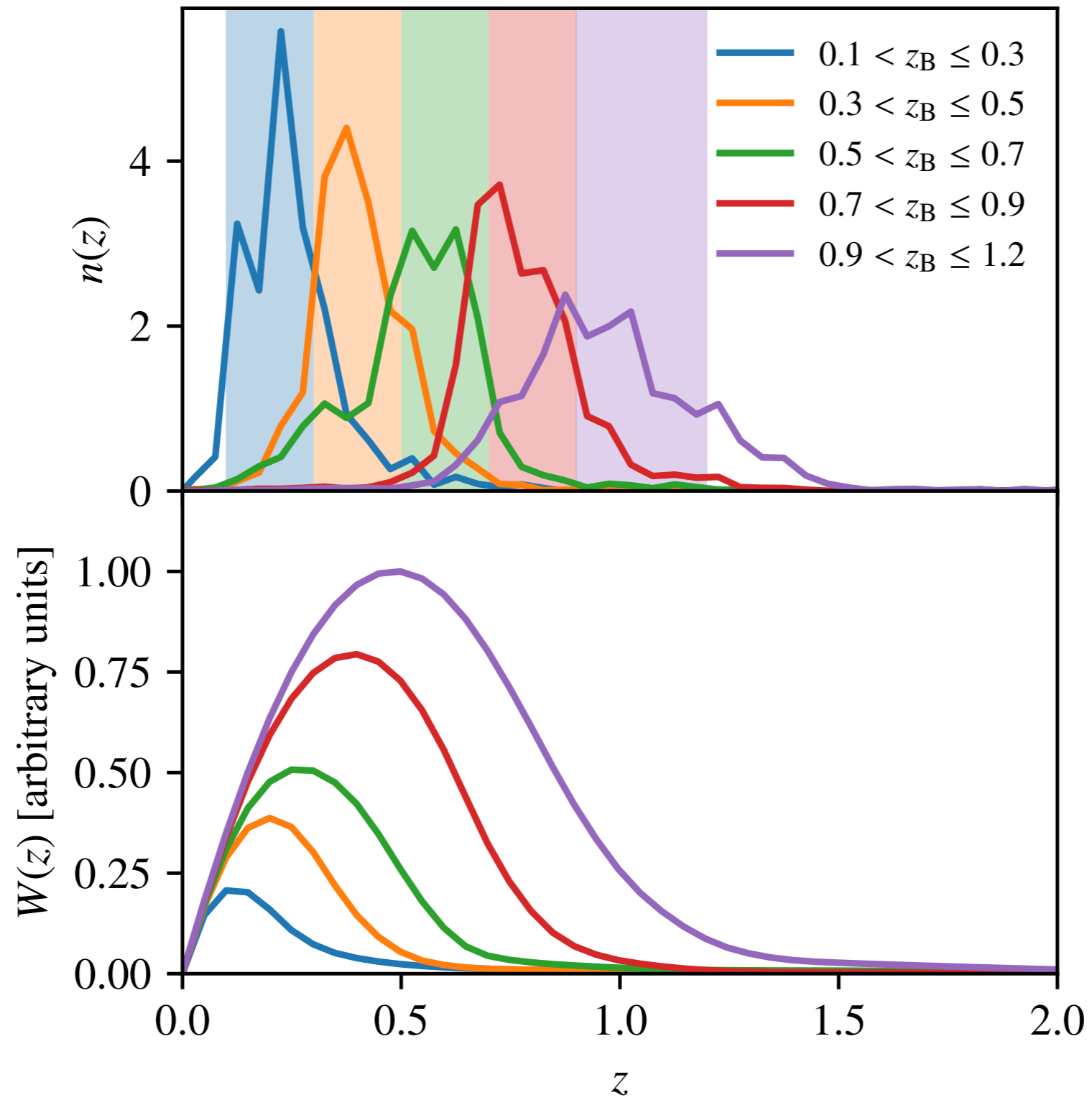
Optimised for weak lensing

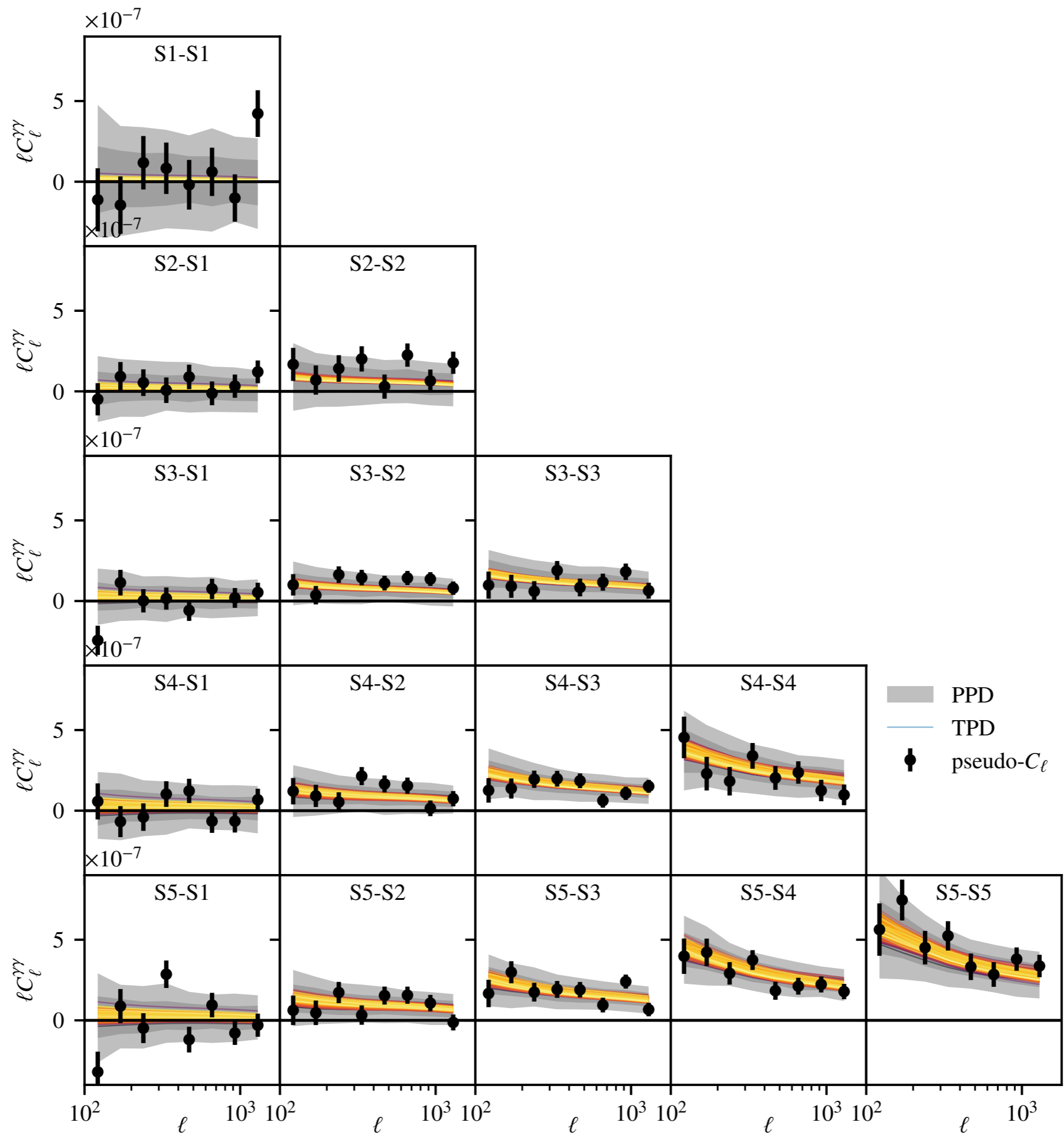
- 1000 deg² analysed
 - Full survey: 1350 deg²
- 21 million galaxies

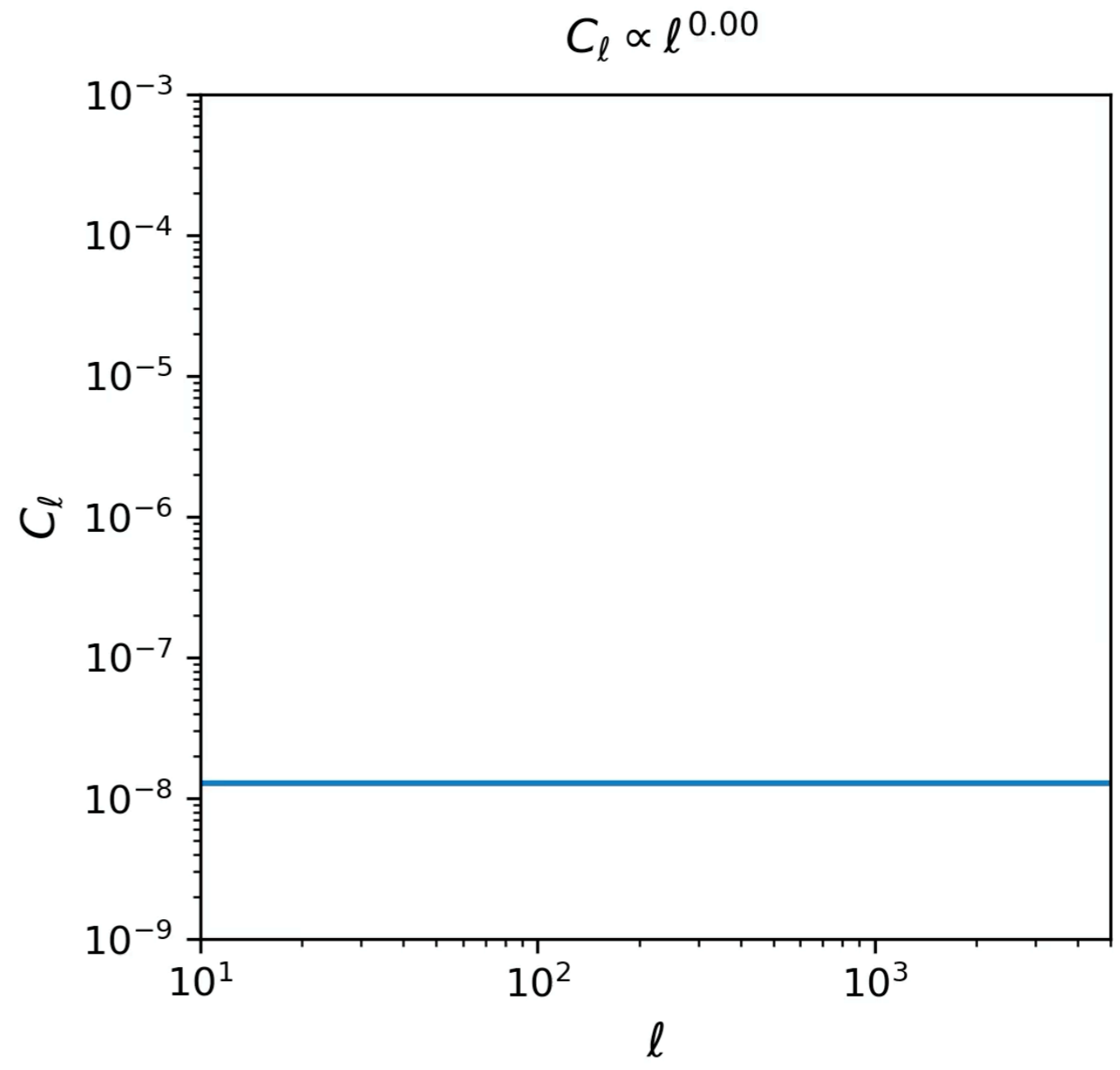
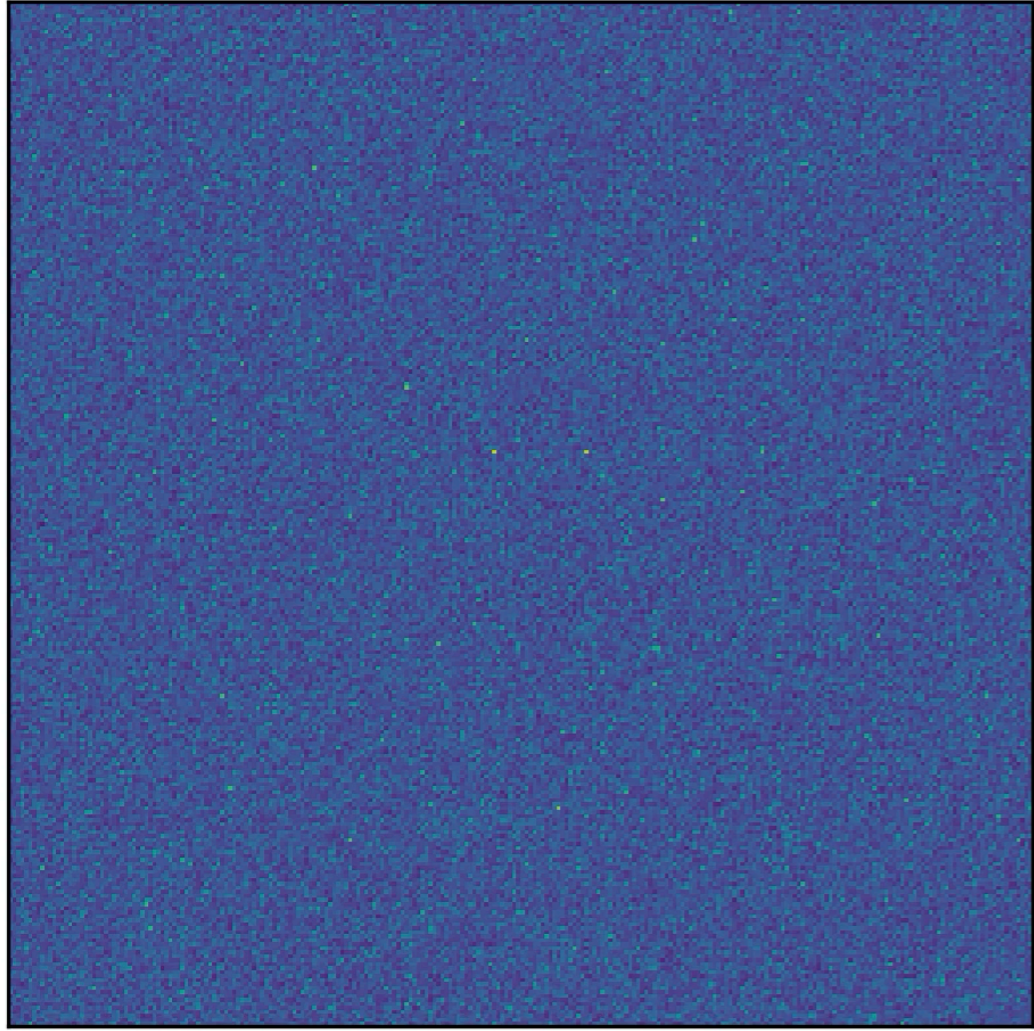
Overlap with VIKING

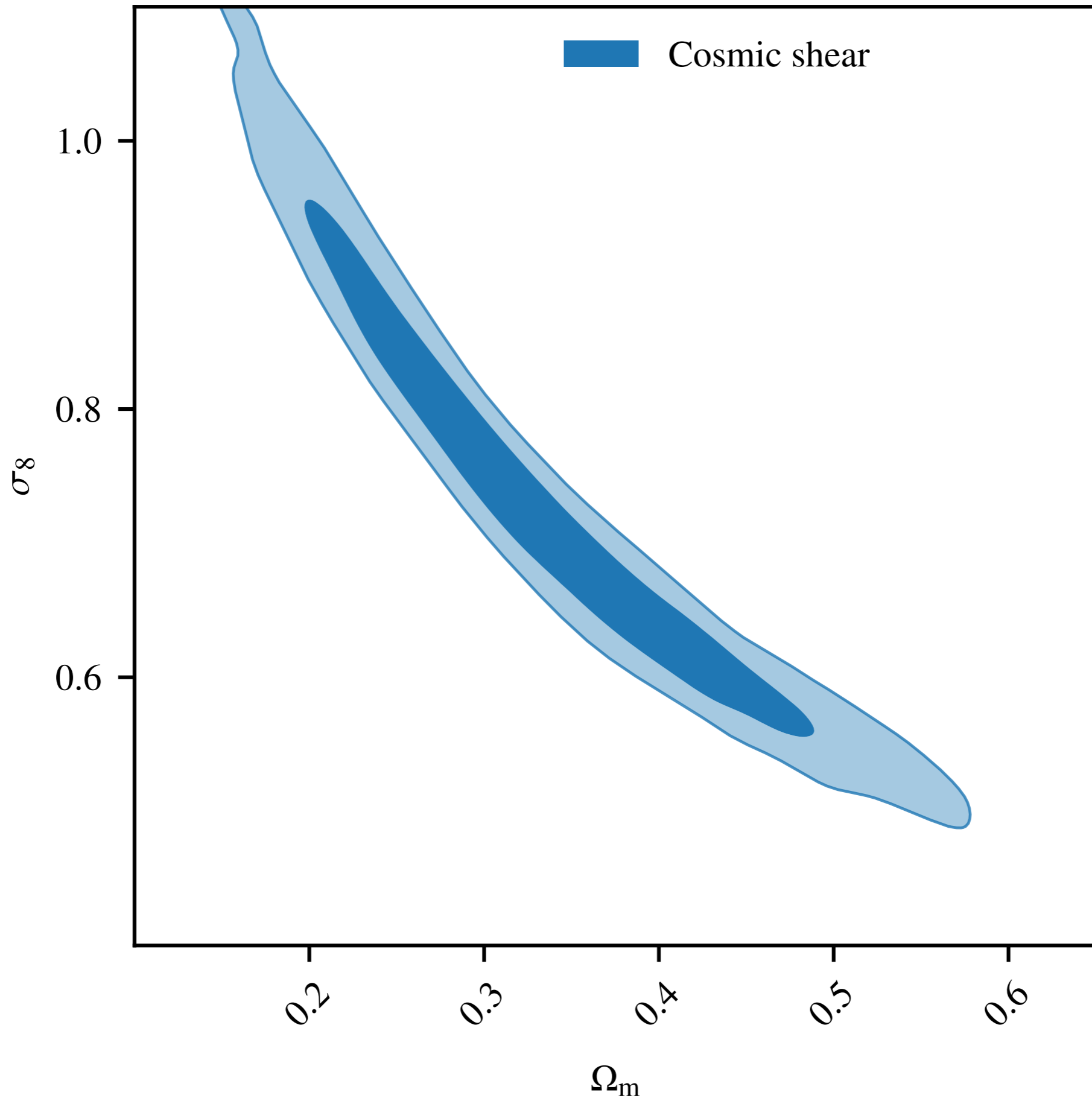
- 9 photometric bands

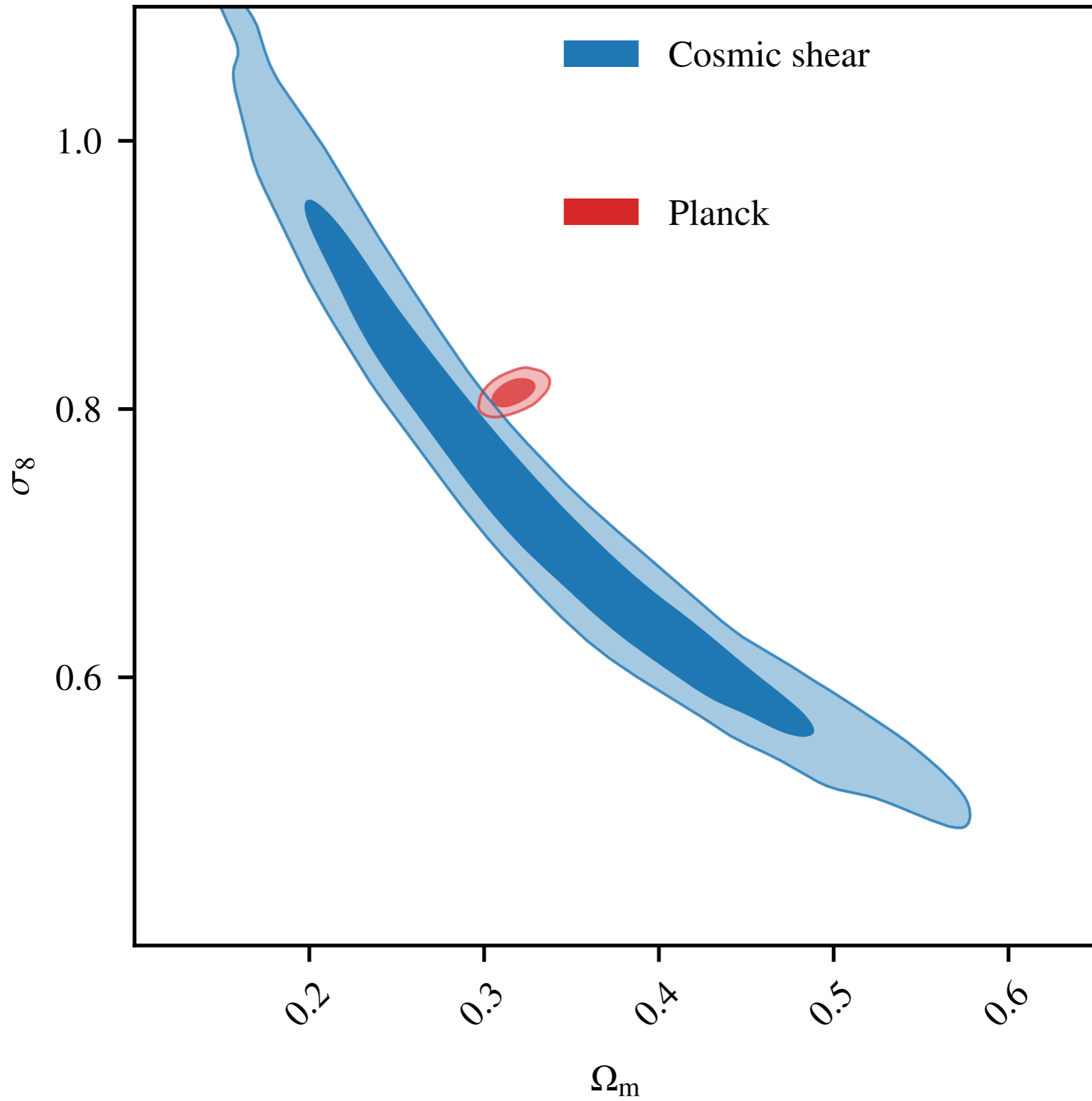
Tomography











KiDS-1000 core papers

Cosmic Shear Cosmology

- Asgari, Lin, Joachimi et al. (arXiv: 2007.15633)

Combined Probe Cosmology

- Heymans, Tröster et al. (arXiv: 2007.15632)

Beyond flat Λ CDM

- Tröster et al. (arXiv:2010.16416)

Methodology

- Joachimi, Lin, Asgari, Tröster, Heymans et al. (arXiv: 2007.01844)

Photometric Redshifts

- Hildebrandt, van den Busch, Wright et al. (arXiv: 2007.15635)

Shear Measurements

- Giblin, Heymans, Asgari et al. (arXiv: 2007.01845)

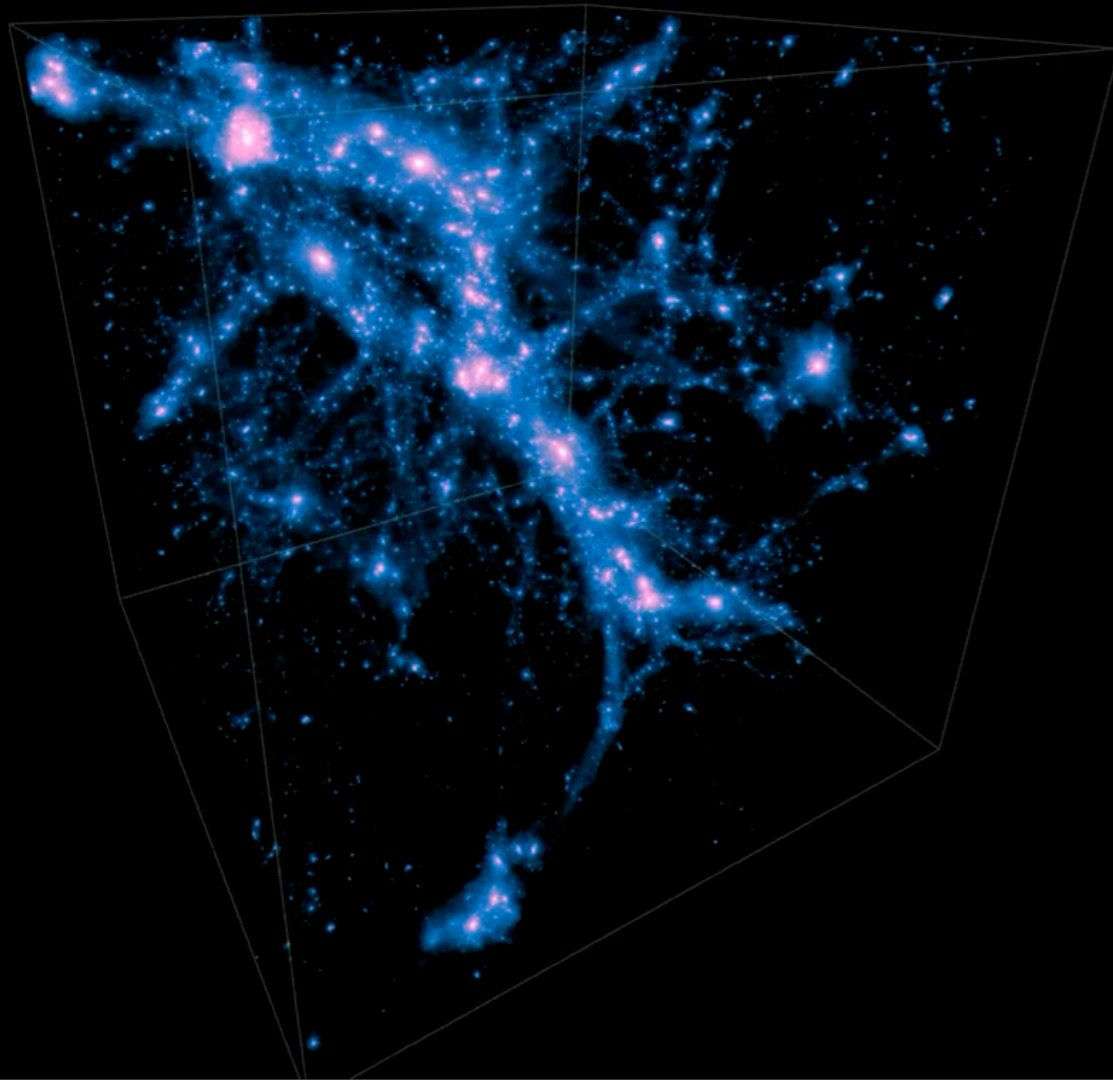
Cosmic shear

- correlation between galaxy shapes
- probes the distribution of **all** matter

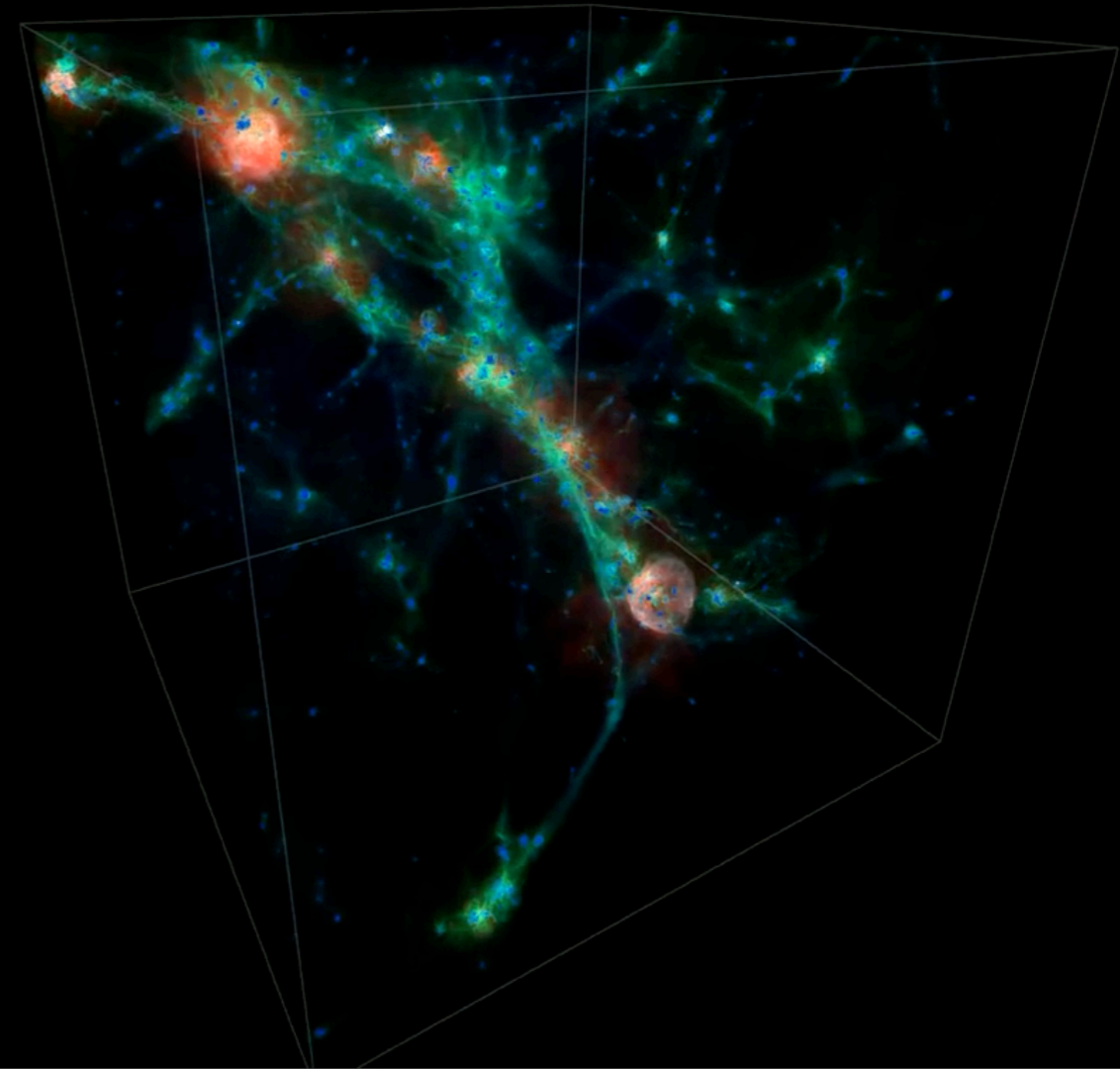
dark matter + baryons!



Dark Matter



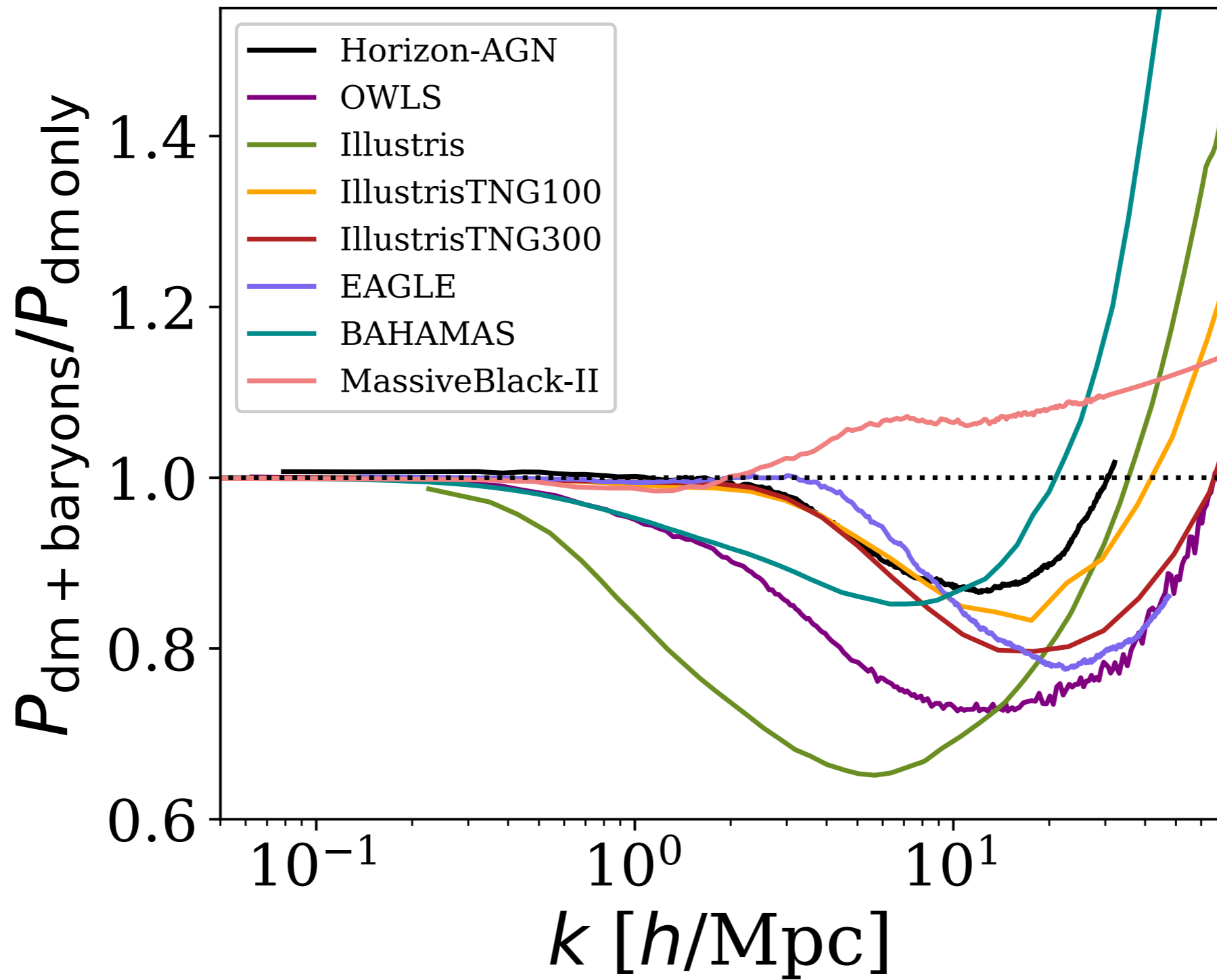
Gas Temperature



redshift : 1.66
Time since the Big Bang: 4.0 billion years

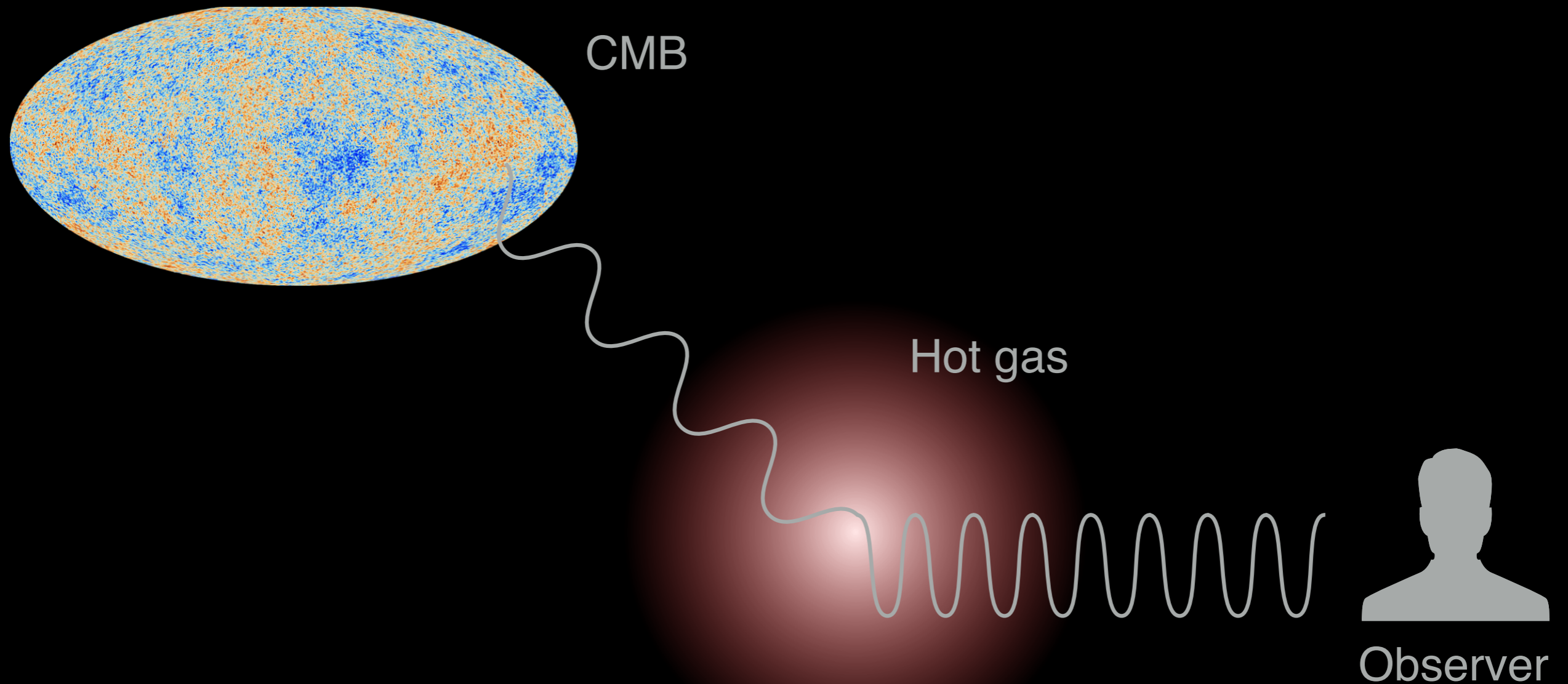
stellar mass : 24.5 billion solar masses

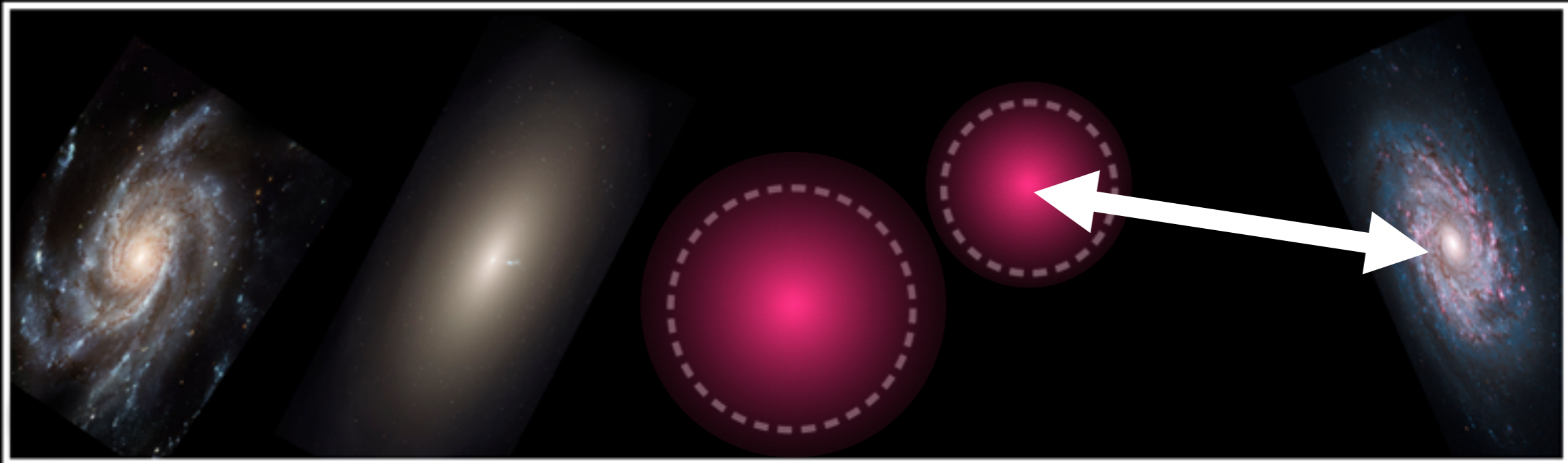
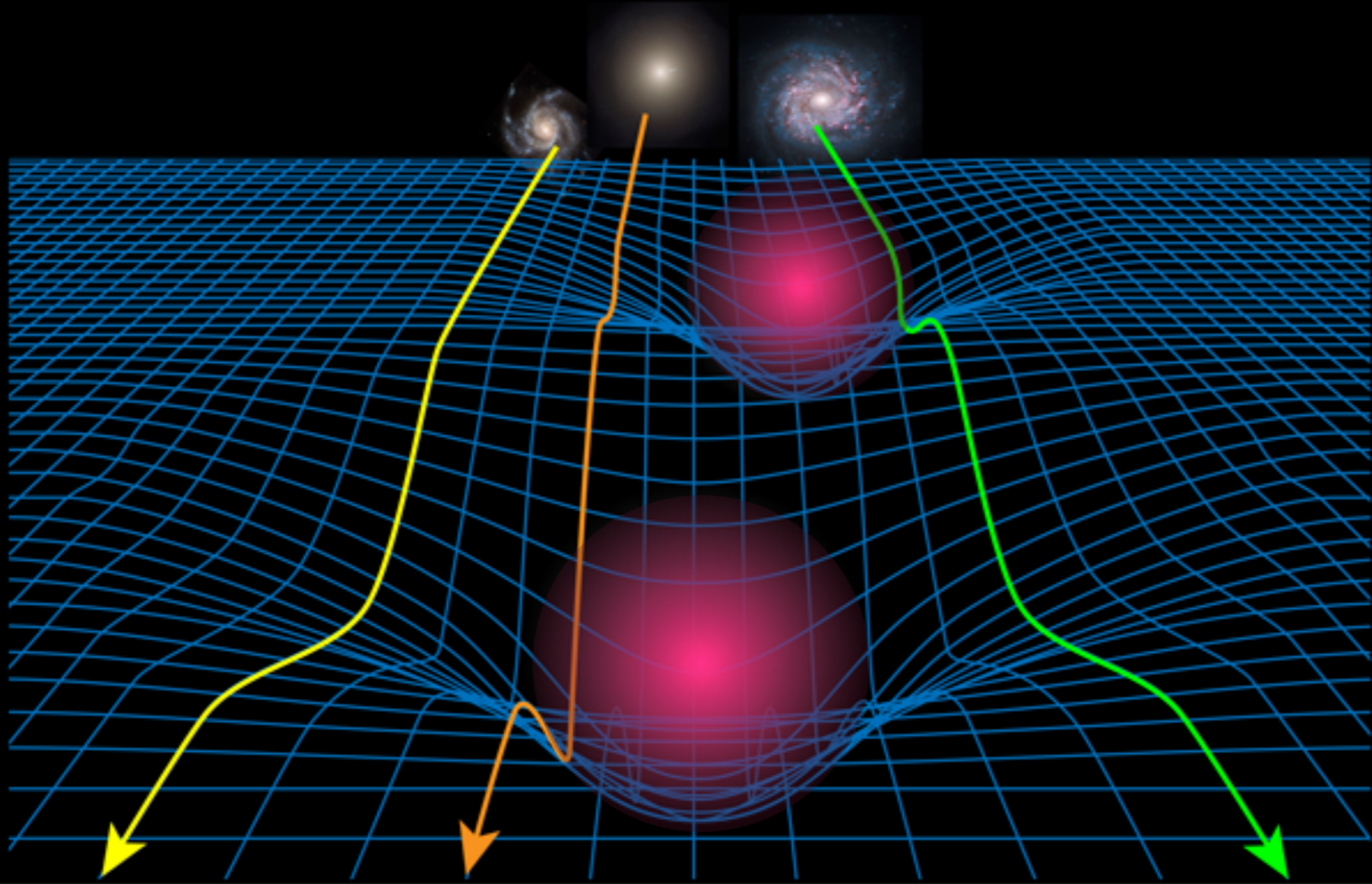
ILLUSTRIS



Chisari+2019

Thermal Sunyaev-Zel'dovich (tSZ) effect





APS/Alan Stonebraker; galaxy images from STSci/AURA, NASA, ESA, and the Hubble Heritage Team

Shear-tSZ cross-correlation

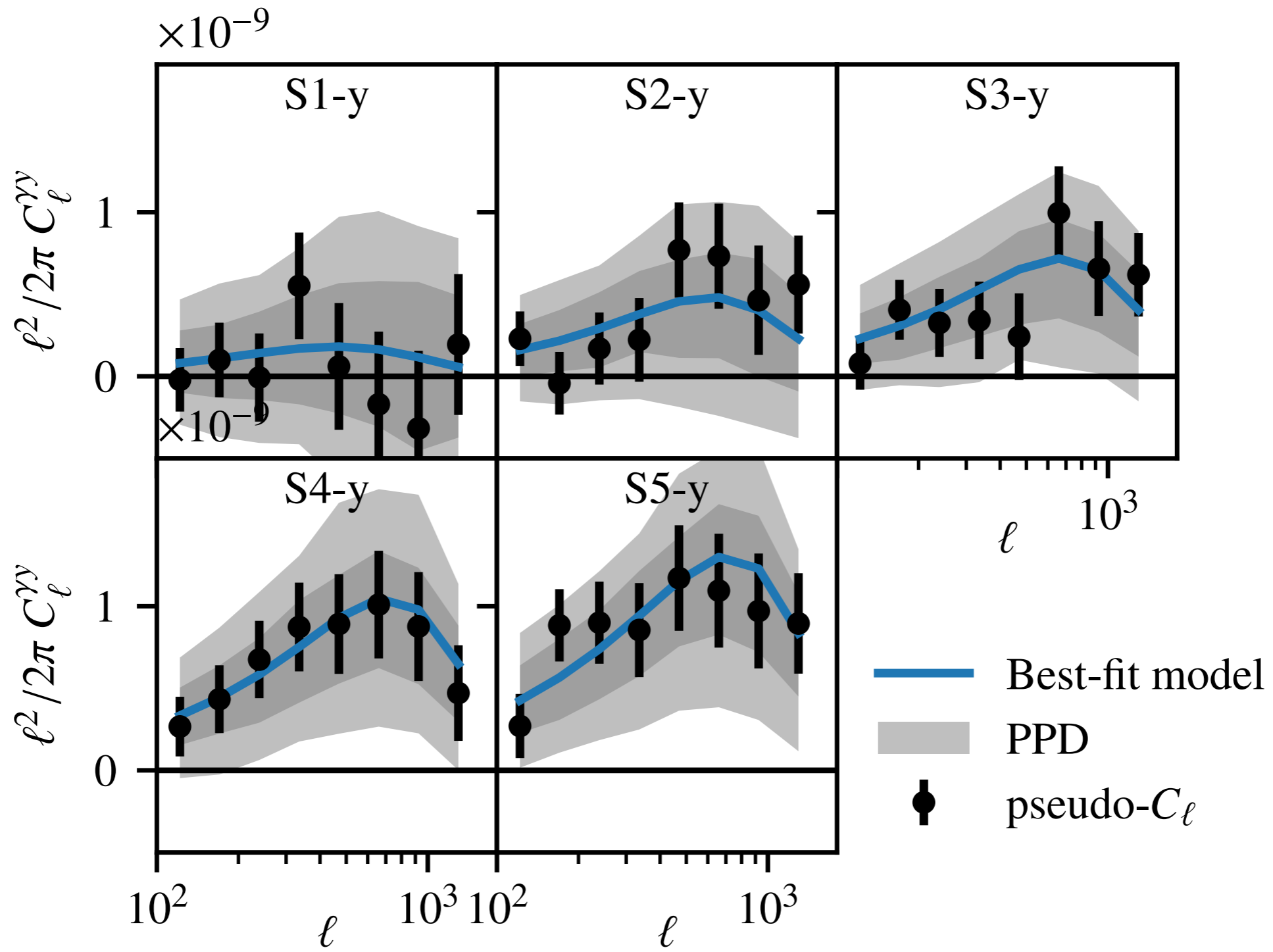
- correlation between galaxy shapes and tSZ effect
- probes distribution of matter and gas

Planck

- Full-sky
- MILCA, NILC, custom CIB-subtracted maps
- Beam: 10'

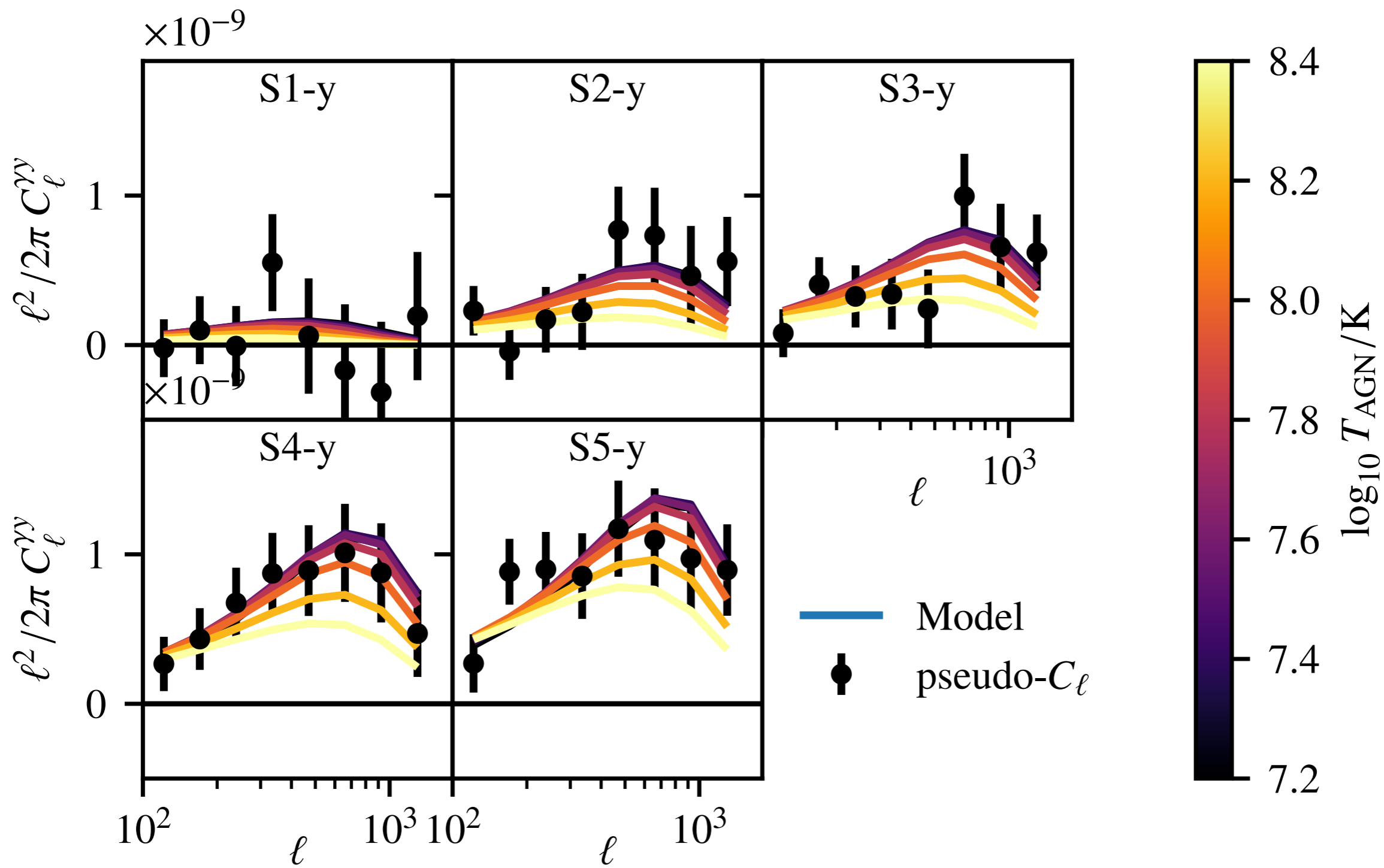
ACT

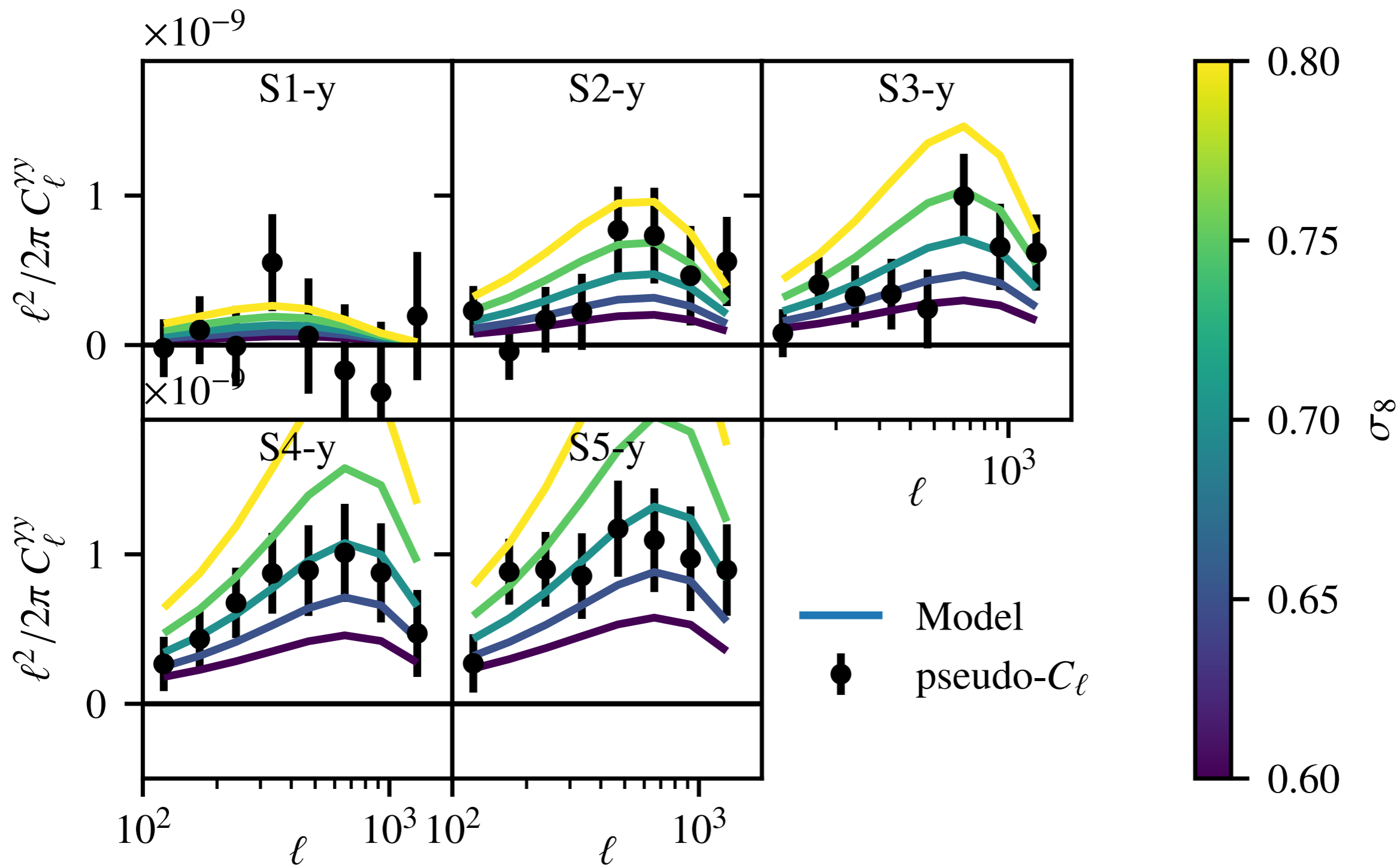
- Partial overlap with KiDS-N
- Combined ACT and Planck data, different components deprojected
- Beam: 1.6'

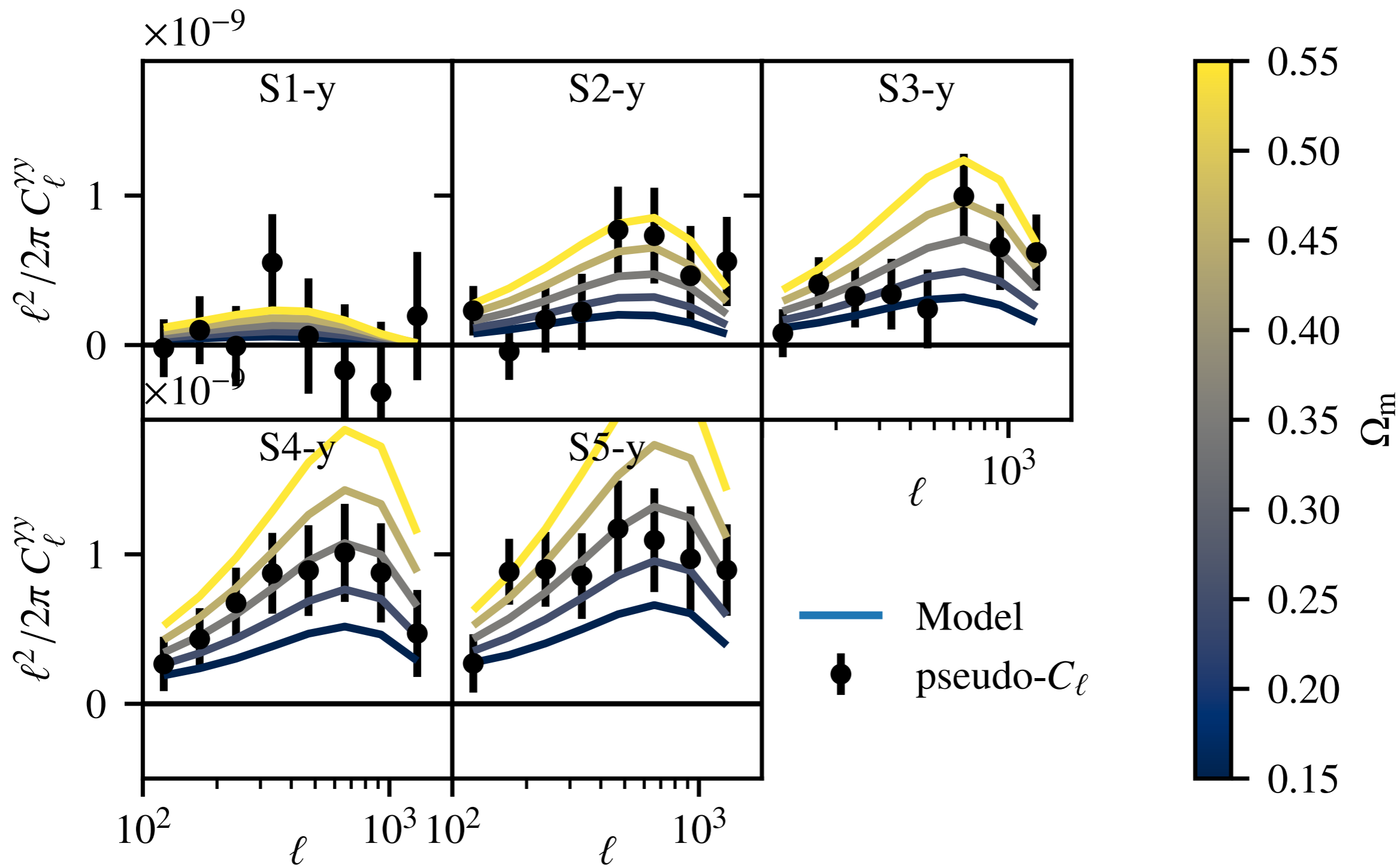


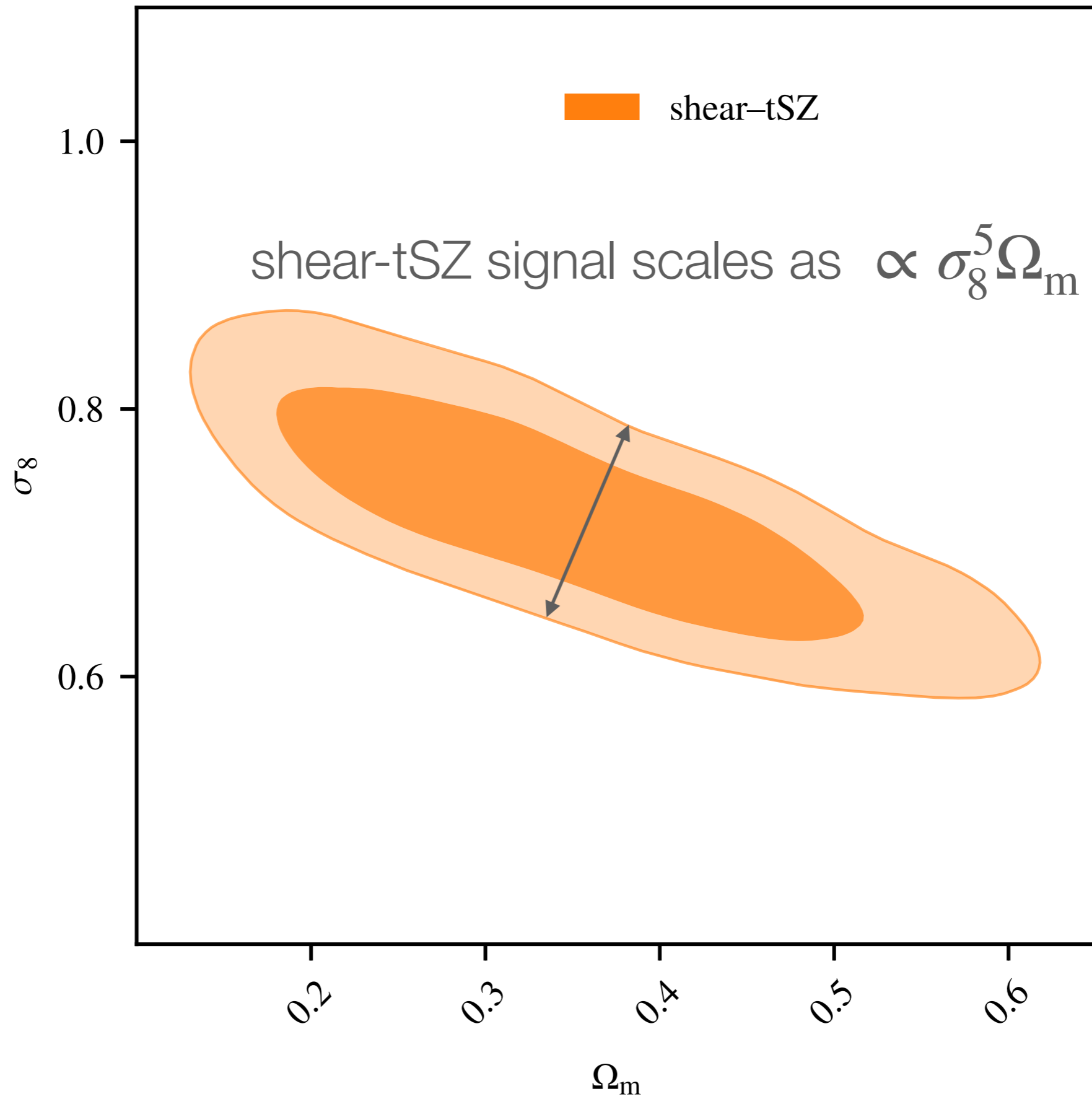
HMx (Mead, Tröster et al. 2020, arXiv:2005.00009)

- Models dark matter, gas, stars components
- Calibrated on BAHAMAS hydrosims
- Reaction formalism for accurate power spectra
- Matter and pressure fields modelled consistently

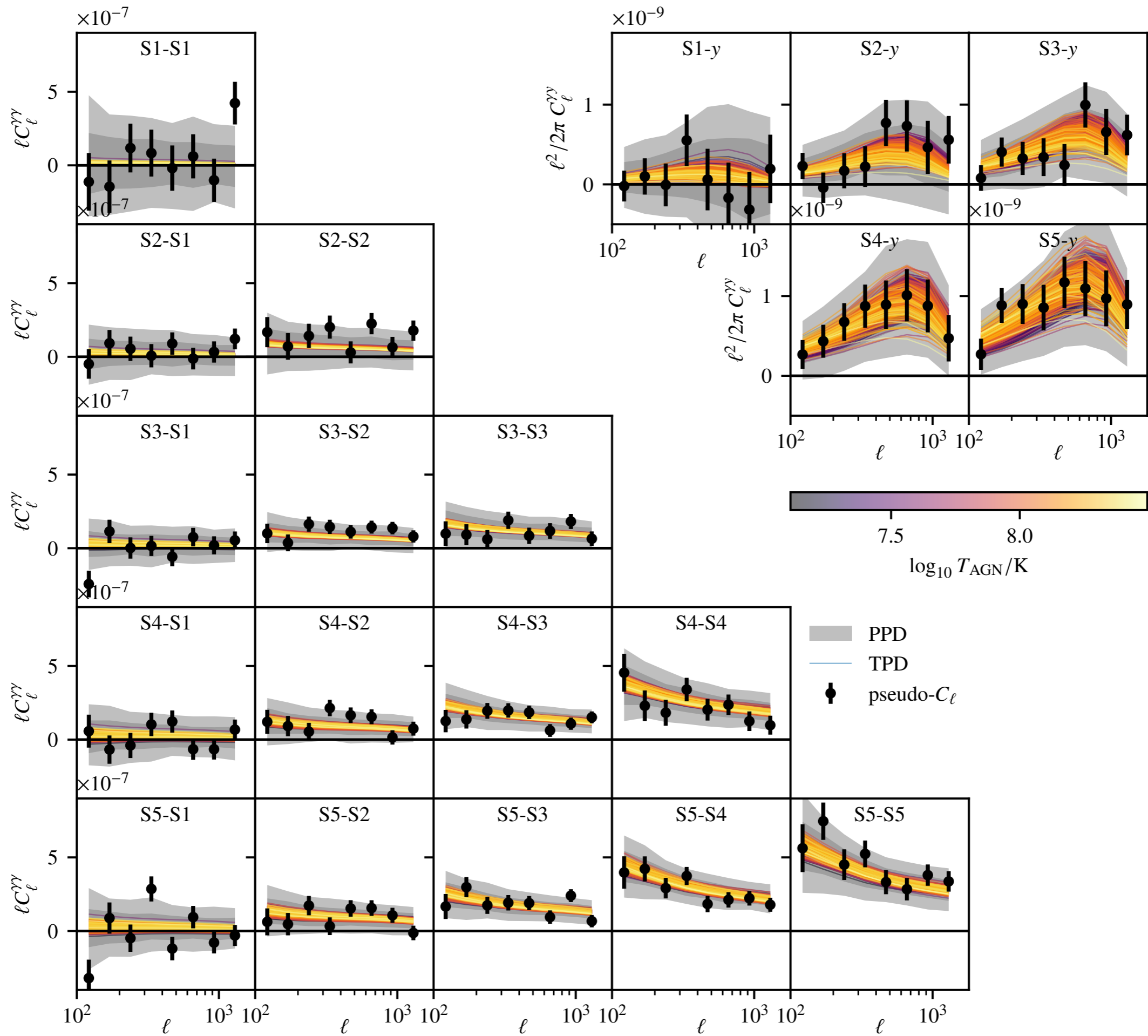


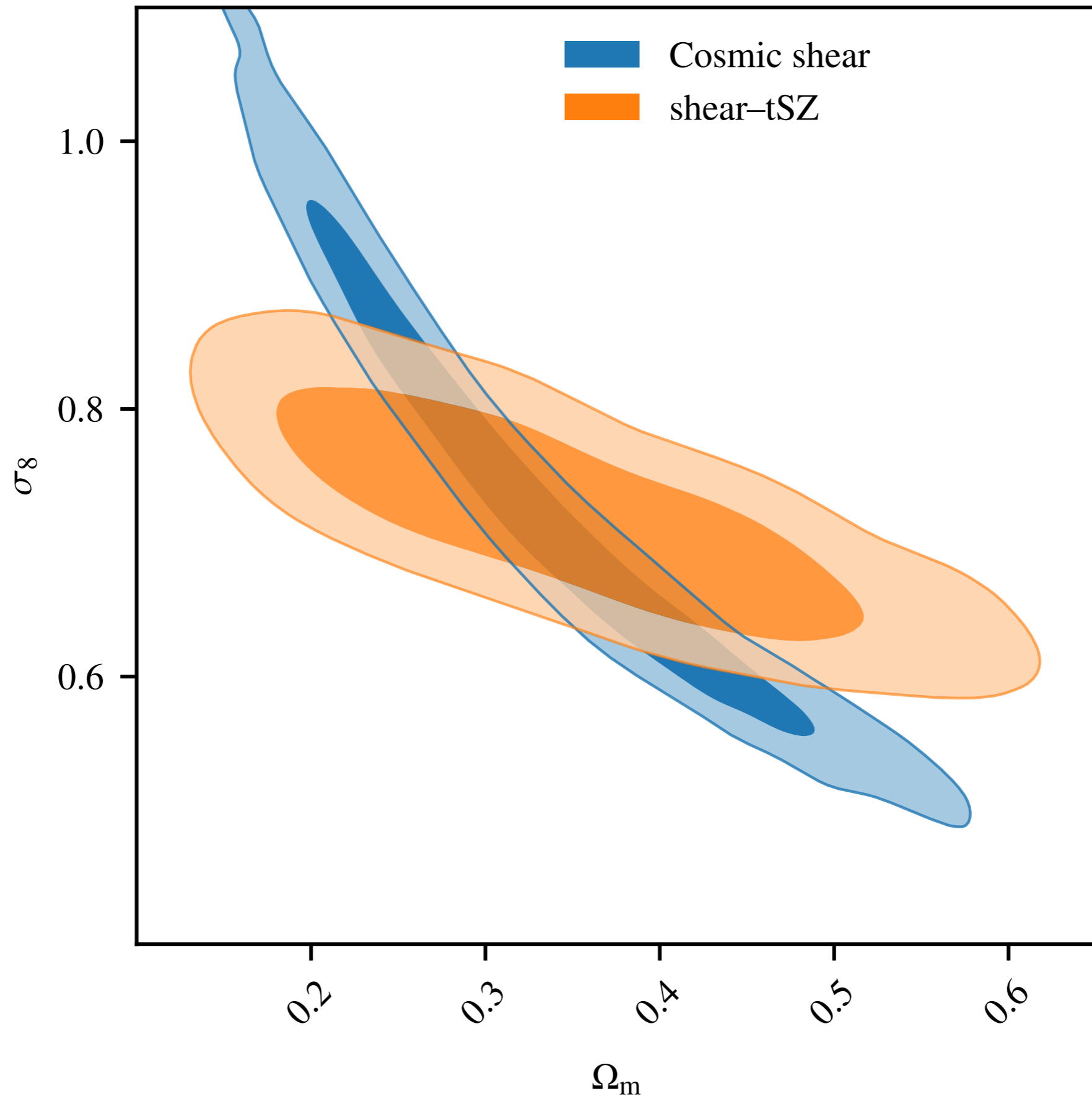


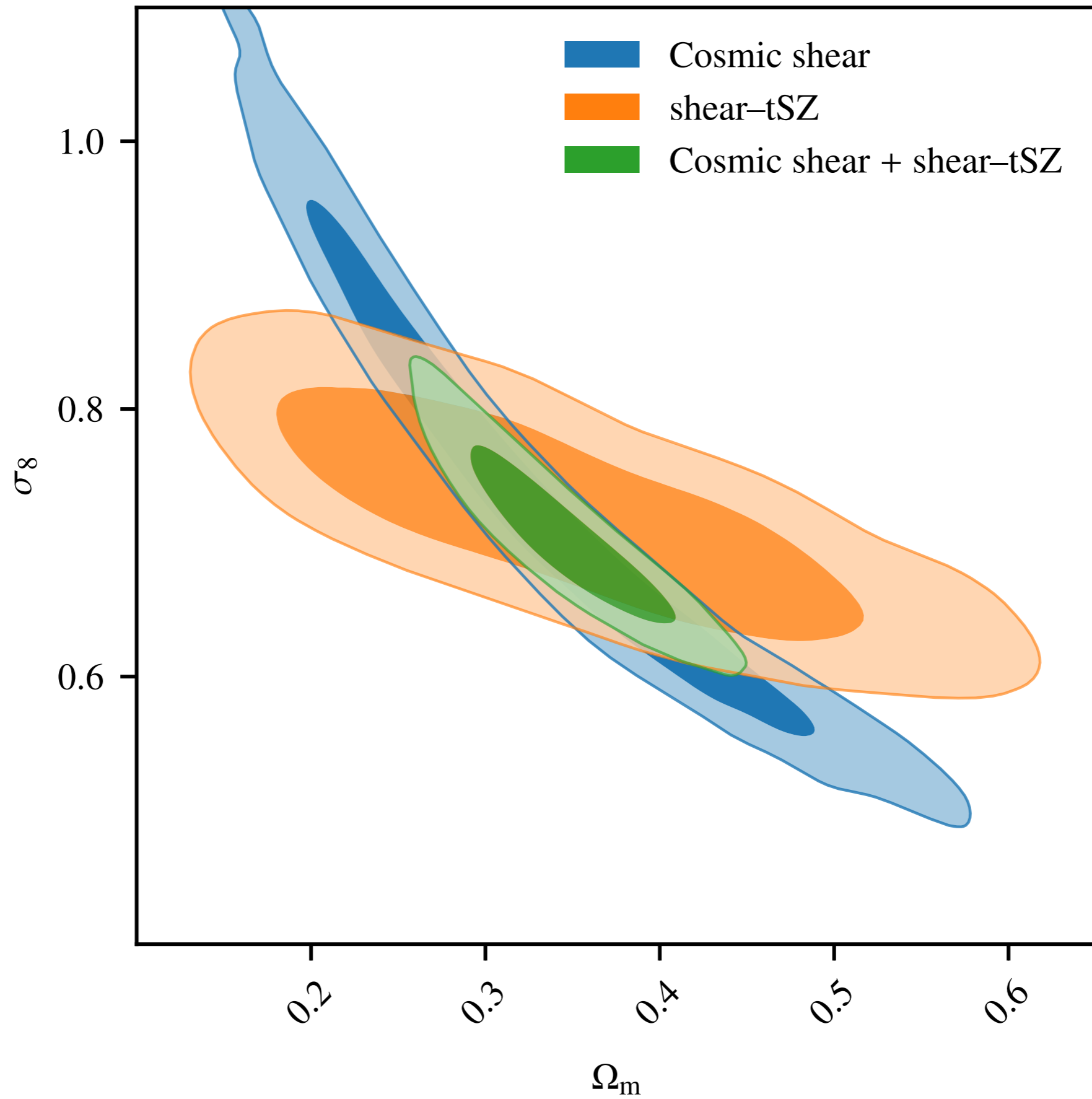


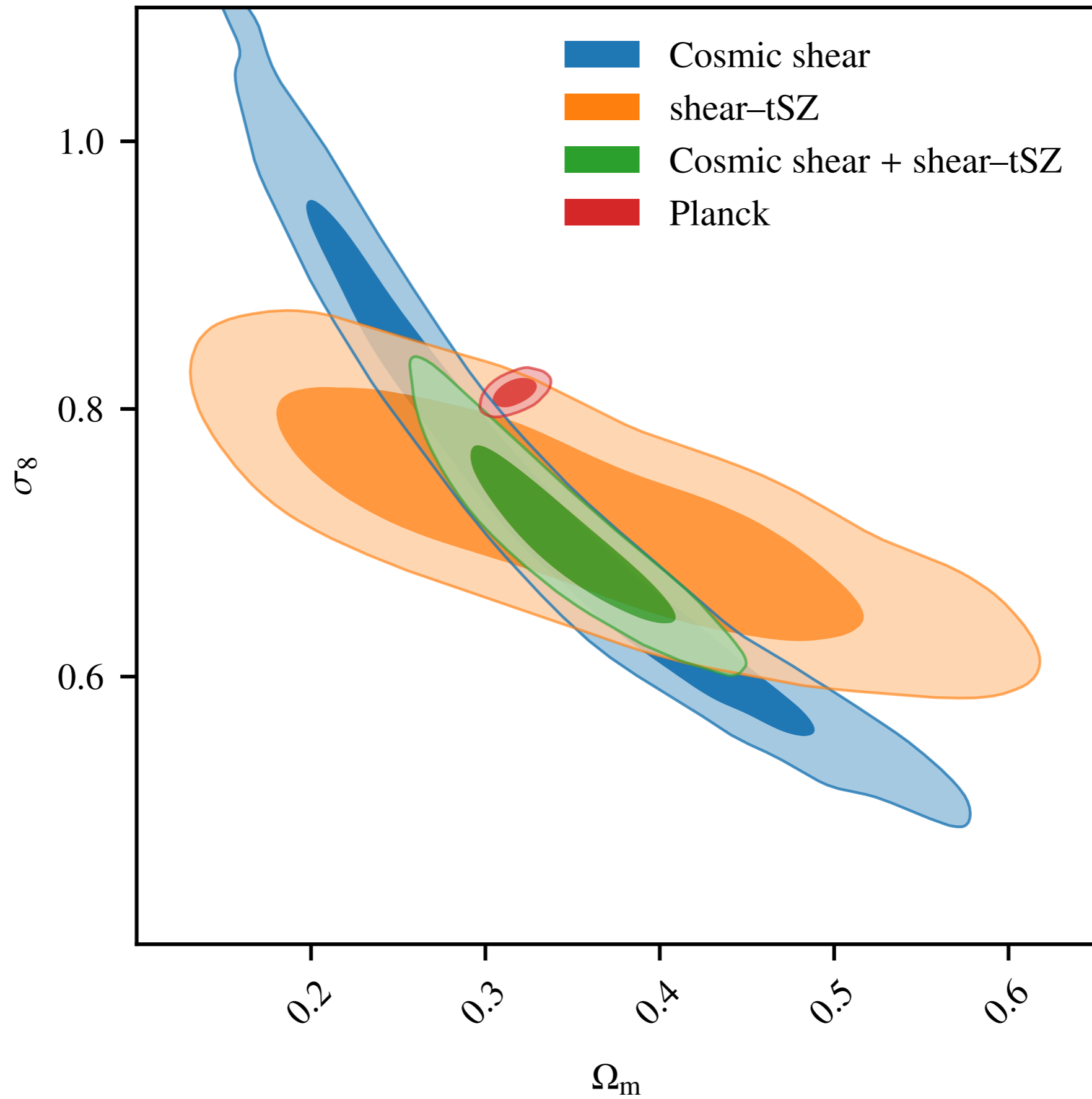


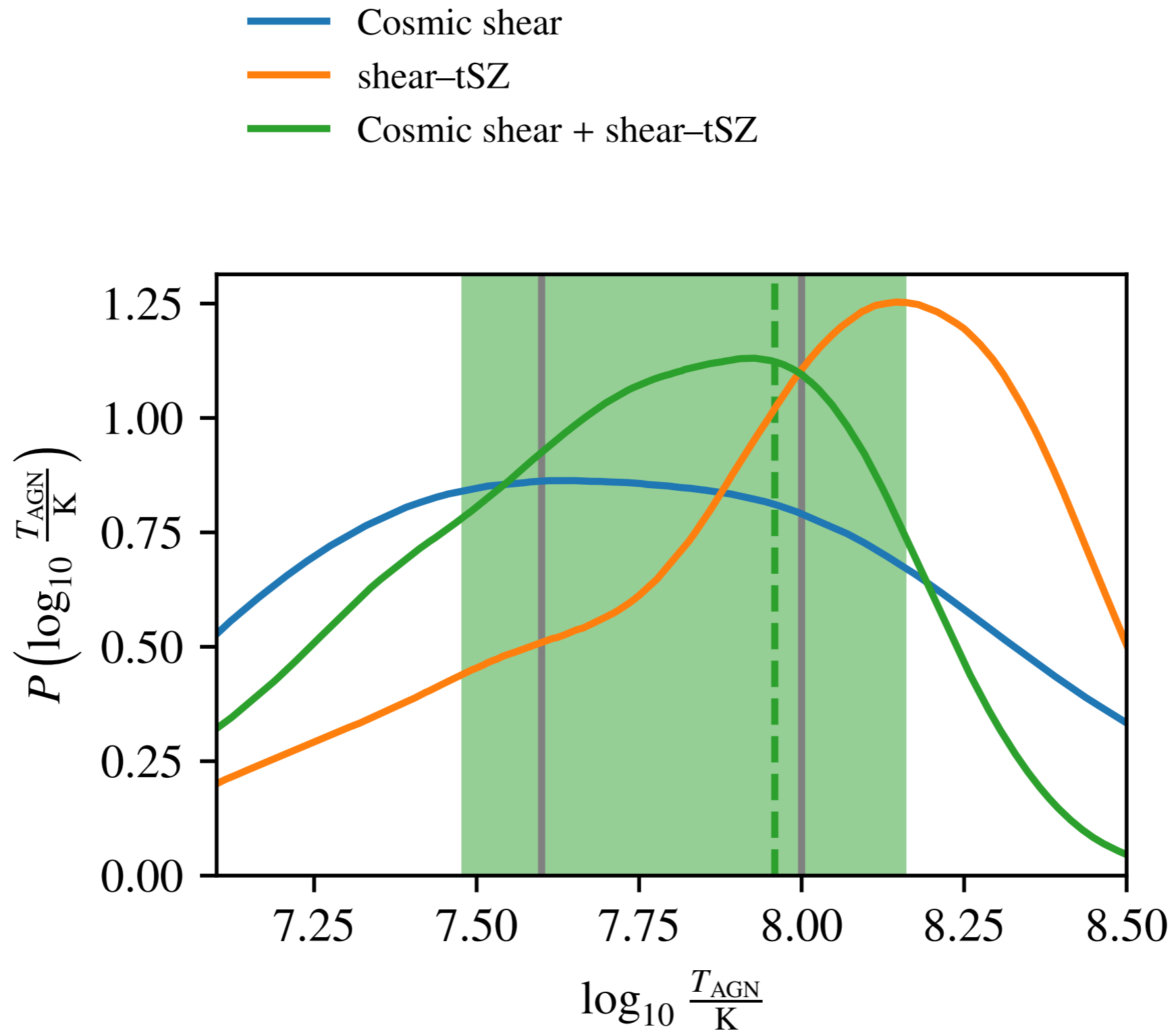
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Summary

- Shear-tSZ cross-correlations can give information on both cosmology and baryon feedback
- Joint analysis of shear-tSZ and cosmic shear breaks degeneracies and gives tight constraints on cosmology
- Modelling needs more work for future data